AIR CONDITIONING HEATING & REFRIGERATION NEWS
The Newspaper of the Industry
RESIDENTIAL — COMMERCIAL — INDUSTRIAL
October 2, 1961
Issued every Monday at 450 West Fort St., Detroit 26, Michigan
Established 1926
Member, Associated Business Publications ABP ABC Member, Audit Bureau of Circulations

Vol. 94, No. 5, Serial No. 1,697
Reentered as second class matter October 3, 1936, at the post office at Detroit, Mich., under the Act of March 3, 1879.
Subscription Price, $6 Per Year (U. S. and Canada). Foreign: $10.00 Per Year.
Trade Mark Registered U.S. Patent Office. Copyright 1961, by Business News Publishing Co.

Special Emphasis on Air Handling

Heating and air conditioning require more than merely the supply or removal of heat, more than a heat source or a condensing unit or an absorption unit. In the majority of heating-cooling installations, air must be moved from and to the occupied area. So *Air Handling* is of primary importance.

- The best furnace won't provide comfort unless it can deliver air properly.
- Compressors burn out, coils freeze up, motors overload —all because air movement is incorrect.
- In large buildings, several methods of zoning must be considered to obtain optimum performance.
- Even in refrigeration, the increasing acceptance of air-cooled condensing has introduced a new technology in moving air to and through condensing units.

While the many facets of this subject are regularly discussed in AH&RN, in this issue the NEWS places special emphasis on Air Handling.

POOR AIR DISTRIBUTION = SICK INSTALLATION ... 6
AIR MOVEMENT SYMPOSIUM —Summaries of conclusions arrived at during 2-day engineering session ... 12
AIR MOVEMENT DICTIONARY ... 15
5 WAYS TO ACCOMPLISH ZONING ... 16
ADD-ON COOLING—Factors to consider to assure proper performance ... 18
AIR-COOLED CONDENSING — the story of its evolution told by a pioneer ... 20
DIRECT DRIVE BLOWER SYSTEM—Formerly considered the 'cheap way' it is now coming into its own with emphasis on quality ... 24
COMBINATION HEATING, COOLING systems for residences offer challenge, whether they be add-ons or complete systems ... 28
PRESSURE LOSSES THROUGH FITTINGS IN RETURN AIR SYSTEMS ... 30
TESTING HIGH VELOCITY DUCT SYSTEMS FOR AIR TIGHTNESS ... 31
EDITORIAL ... 14
OFF THE CHEST ... 14
TECH CENTER ... 15
WHAT'S NEW ... 23

Award $2 Million Heating-Cooling Contract to Lennox

FT. WORTH, Texas — A contract for $2,045,000 worth of residential heating and air conditioning equipment to be installed in Fort Worth's Rancho North Addition will mark the first installation of a new Lennox "QC" heating-air conditioning builder package.

Featuring a new compact condensing unit which measures only 13 in. deep by 38 in. high and 38 in. wide, the system employs precharged refrigerant lines with quick couplers and a new furnace unit in which the cooling coil is integral, according to Lennox Industries, Inc.

Lennox will publicly unveil this new combination at the National Assn. of Home Builders' show in Chicago in December.

The $2 million-plus heating-air conditioning contract was negotiated recently by Sabine Valley Lumber Co., developer, with Lennox Industries.

(Continued on Page 22, Col. 2)

Delaware Home Air Conditioning Project Called Success; Mull Use In Other Areas

By Phil B. Redeker

WILMINGTON, Del.—Within four months after its launching, the "Delaware Residential Project," an intensified promotion effort aimed at generating more sales of central year-round air conditioning in new homes, has racked up enough solid achievement to have it termed "an unqualified success" by the Air-Conditioning & Refrigeration Institute, primary sponsor of the test promotion.

Not only did the program stimulate tremendous interest on the part of the home-buying public in the Wilmington area, but it attracted the attention of air conditioning, home construction, and allied industries throughout the nation. Meetings have been held to give consideration to an extension of the program to other parts of the country.

Specifically, from May 13 to the end of August, the nine builders originally identified with the project reported combined total sales of approximately 225 homes with "The Crowning Touch," for an aggregate return of more than $3 million, and estimated that approximately 75,000 visitors had been attracted to their sites. These figures do not include the results of two other builders who joined the project in mid-July.

Moreover, it is forecast by those in the air conditioning and in the home construction fields here, that for the 12 months' period from mid-May, 1961 to the same date in 1962—

- Some 30% of all new homes built during this period will have central year-round air conditioning (well over the national average for new homes, which is just a little over 10%, and well above the prediction for the Wilmington area).
- About 15% more new homes will be sold during this period than had been forecast, and the "Crowning Touch" promotion will get credit for most of this increase.
- An increase of some 5% in the number of new homes being built in the area, over the most optimistic forecast, is likely, and here again the promotion gets the credit.

Six of the nine builders who entered into the program at its inception expressed themselves as being well pleased with results of their participation. Two were "satisfied." Not one was

(Continued on Page 2, Col. 5)

* * *

So He Has a Caddy, But Is He Cool?

NEW YORK CITY — A man's desire for an air conditioned home is now a more reliable indicator of his status than the kind of car he drives, according to Robert G. Smith, Chrysler Corp.'s director of consumer research.

The current popularity of even the lowest-priced compact cars with all income brackets has just about ended the role of the automobile as a traditional status symbol, Smith told the National Industrial Conference Board's recent annual marketing conference here.

More dependable indicators, he said, are the desire to own home air conditioning, hi-fi, and common stocks.

Introduce 15-Ton Gas Air Conditioning Unit

LOS ANGELES — More than 100 gas utility engineers, air conditioning contractors, architects, and consulting engineers recently were shown a new "highly efficient" Statham-Swearingen, Inc. 15-ton gas air conditioning unit.

The unit on display, Swearingen model GA-15, "demonstrated its capability of air conditioning a moderate size building at an

(Continued on Back Page, Col. 3)

Iron Fireman Bids For Warren Webster

CLEVELAND—Iron Fireman Mfg. Co. here is planning to acquire Warren Webster & Co., Inc., Camden, N. J., in an exchange of stock, it was disclosed in a joint statement by Lewis J. Cox, Iron Fireman president, and Herbert A. Wagner, president of Warren Webster.

According to a letter to shareholders signed by Cox, directors of Iron Fireman proposed offering 44,000 shares of authorized but unissued common stock in exchange for all the common stock of Warren Webster.

(Iron Fireman shares closed last Monday on the American Stock Exchange at $19.50, according to the *Wall Street Journal*, which noted that at that

(Continued on Back Page, Col. 1)

Inside Dope

By GEORGE F. TAUBENECK

Learn to live and laugh — thus delay your epitaph

Extending the Bonus Racket

Reading that $100,000 checks are tossed away to high school athletes who sign contracts with baseball clubs, a friend suggests that equal time might be demanded by industry.

If that happens, we may be reading news items such as:

DETROIT—American Motors announces the signing of Shill Hammer, 14-year-old mechanical genius from suburban Grosse Pointe, for a $60,000 bonus. Shill, who had been tempted by Ford, Chrysler and General Motors, said he signed with George Romney because he thought he had a better chance to get ahead with a smaller concern. He has been farmed out to a Class-D garage in Dearborn.

SCHENECTADY, N. Y. — Steve Price today became the property of General Electric Co. Price is the lad who built his own atomic reactor from discarded junk recovered from his father's swimming pool. GE paid a whopping $100,000 bonus to this brilliant boy's guardian. (His parents disappeared during an earlier experiment which also erased the Price homestead and the nearby suburb of Hillsdale.)

NEW YORK CITY—Publisher Huntington Hatfield has signed as a future novelist 10-year-old Melissa Hatfield, his third daughter by his fifth wife. Hunt defended her $85,000 bonus by revealing that this child has magnificent control of sentence structure, uses major league adjectives, goes either way with

(Continued on Page 8, Col. 1)

U.S. Use of Advisory 'Clean Room' Criteria as Specs Protested

CHICAGO — Differences over the application of government criteria for the design and operation of "clean rooms" were thoroughly discussed when government and industry representatives met here recently under the auspices of the newly-formed American Association for Contamination Control.

Discussion centered around the pioneering and controversial Air Force Technical Order on Design and Operation of Clean Rooms, T.O. 00-25-203.

The order, according to its author, Earle Bodem of the U. S. Air Force Logistics Command Headquarters at Wright Patterson Air Force Base in Dayton, developed out of the needs of his agency in the design and operation of clean rooms used in Air Force Maintenance.

It was originally intended as a guide for Air Force suppliers, but its use has since been extended to the Army, Navy, and National Aeronautics and Space Administration.

Its purpose was to serve as a pioneering effort to put together available knowledge on contamination control in one manual for advisory purposes only.

However, industry representatives protested, the Technical Order is now being incorporated in government contracts as specifications which suppliers are

(Continued on Back Page, Col. 1)

Mueller Climatrol Ups Schmidt, Hase

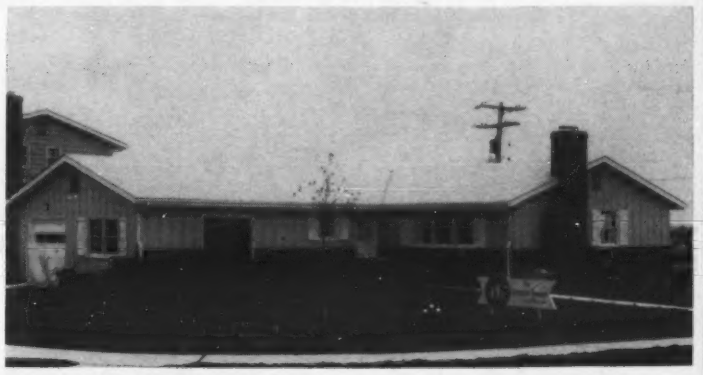
MILWAUKEE—H. P. Mueller, Jr., president of Mueller Climatrol Div. of Worthington Corp., has announced the appointments of Richard B. Schmidt to the newly-created position of manager of marketing and George M. Hase to the position of sales manager.

Schmidt joined Mueller Climatrol in 1947 and has served as sales correspondent, sales repre-

(Continued on Page 22, Col. 3)

INDUSTRY TRAINING EXPERTS took part in training school activities directed at assisting the realty salesman. L. to r. here are J. A. Clarke, Chrysler Airtemp; Kelly Snow, Kelly Snow Sales Development Co., Palo Alto, Calif. training authority on new home selling; Neil Hedger, Lennox Industries, Inc.; Hermine Weinstein, Franklin Builders; Kenneth R. Vaughn, Carrier Corp.; George Barinus, Henry Rinard, and Henry Weinstein, Franklin Builders; James P. Gallagher (standing) House & Home magazine.

CLASSROOM SESSION attended by sales representatives of Wilmington, Del. area home builders hear expert advice on technique of modern home selling from Kelly Snow of the Kelly Snow Sales Development Co., Palo Alto, Calif. Sessions were held throughout the week prior to the weekend opening of Wilmington area homes offered by builders tieing in with "The Crowning Touch" promotion, meaning that they were equipped with year-round whole home air conditioning.



RIGHT IN THE FRONT YARD is the condensing unit section (seen behind the site sign in the photograph) of the whole home air conditioning system featured by Wilmington, Del. home builder Frank Robino in his "Terrace House" in his Meadowood development. He put the unit out in front because "air conditioning, for the present at least, has no other external status symbol."

Wilmington Project

(Continued from Page 1)

unhappy about the venture, and all said they would participate again in a similar project if opportunity were offered.

Those air conditioning dealers who work with builders who had substantial sales of homes with year-round air conditioning were naturally pleased with the program.

The "Crowning Touch" promotion got under way last May after six months' advance planning by ARI in cooperation with *House & Home* magazine and a number of manufacturers of air conditioning equipment. The project also enlisted the support of the Home Builders Association of Delaware, Inc., and the Delaware Power & Light Co.

Delaware seemed to be the ideal area for the purposes of the project because of its median climate, expanding economy, and substantial number of progressive home builders. However, the market for new homes had been "off" somewhat, and it was felt that all in all the area would be a fine testing ground for the contention that central air conditioning in a good, quality home could make that home exciting enough to appeal to families already fairly well housed.

When the area was definitely selected last November, the ARI formed a "Delaware Residential

(Continued on Page 4)

AIR CONTROL'S
NEWEST!
Curved Aluminum Blade REGISTERS and GRILLES
Engineered for the toughest specs...
Priced for the lowest bid!
Air Control's new 200 Series Curved Aluminum Blade Registers and Grilles are ideal for a wide range of heating/cooling applications—for ceiling, high sidewall or low sidewall installation. A variety of blade arrangements is available for 1, 2, 3 or 4-way deflection. Spring tension holds blades firmly in any position and allows an unlimited number of easy adjustments. Multi-louver valve accurately controls air volume and is ideal for shallow-duct installations. Exclusive Adjusto-Stop permits convenient balancing at the register face.
The progressive engineering displayed in the development of the 200 Series is typical of all Air Control registers, grilles and diffusers. Write today for Bulletin 305-AC giving complete information and detailing the 200 Series' low prices!
LOOK TO Air Control for QUALITY
AIR CONTROL
AIR CONTROL PRODUCTS, INC. 361 CENTER STREET, COOPERSVILLE, MICH.
West Coast Warehouse: Leigh Industries (California), Inc., 649 S. Anderson Street, Los Angeles, California. MADE IN CANADA BY: Leigh Metal Products Ltd., 72 York Street, London, Ontario. Prairie Provinces Affiliate: Leigh Products Western Ltd., 313 Archibald Street, St. Boniface, Manitoba.

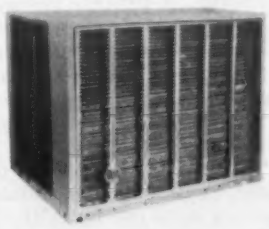
"LIFTS YOUR FAMILY TO ROYAL COMFORT AND HEALTH" is what newspaper advertisements emphasized in "The Crowning Touch" new home promotion. Copy emphasized "more family living," that "housework is a breeze" and the benefits for "your family's health." Listed were projects in which "Crowning Touch" homes with whole home air conditioning could be found.

New
General Electric
QUIK-ATTACH
Central Air Conditioners,
can be connected
through a hole in
the wall about
this size

NEW TA 22G/TXA 22C UNITS DRASTICALLY REDUCE INSTALLATION COST . . . COMBINE ALL THE FLEXIBILITY OF A SPLIT SYSTEM WITH THE MANY FACTORY-SEALED ADVANTAGES OF AN INTEGRAL UNIT.

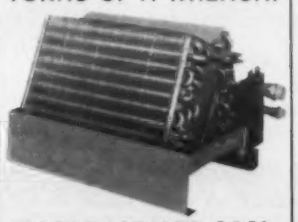
NOW, G. E. BRINGS YOU AN EXCITING CONCEPT IN RESIDENTIAL CENTRAL AIR CONDITIONING. INSTALLATION IS EASY AND INEXPENSIVE, THANKS TO "QUICK-ATTACH" LINES THAT ELIMINATE BREAKING A LARGE HOLE IN THE WALL TO ALLOW PASSAGE OF THE EVAPORATOR COIL. OPERATION COST IS LOW, BECAUSE ALL COMPONENTS ARE FACTORY-CHARGED, DESIGNED AND WIRED TO GIVE MAXIMUM COOLING AT MINIMUM EXPENSE. THERE ARE NO LINES TO ASSEMBLE OR CUT, NO PURGING, CHARGING OR EVACUATING, AND NO BRAZING.

THE TA 22G/TXA 22C WILL SAVE YOU TIME AND MONEY . . . GIVE YOU A TREMENDOUS ADVANTAGE IN COMPETITIVE ESTIMATES. FOR COMPLETE INFORMATION, CONTACT YOUR G. E. DISTRIBUTOR, OR WRITE TO: GENERAL ELECTRIC COMPANY, AIR CONDITIONING DEPARTMENT, CENTRAL AIR CONDITIONER SECTION, TYLER, TEXAS.



FACTORY-SEALED CONDENSING UNIT. WEATHERPROOF, CHARGED AND HERMETICALLY SEALED AT THE FACTORY. CONDENSER COIL—DEVELOPED BY G. E.—CONSISTS OF THOUSANDS OF TINY ALUMINUM "SPINES" THAT COOL 50% MORE EFFICIENTLY THAN CONVENTIONAL PLATE FINS.

FACTORY-SEALED REFRIGERANT LINES. AVAILABLE IN 25′, 32′ AND 40′ LENGTHS. PURGED, CHARGED AND EVACUATED. "QUICK-ATTACH" COUPLINGS GIVE EFFECTIVE "PLUG-IN" HERMETIC JOINT WITH JUST A FEW TURNS OF A WRENCH.



FACTORY-SEALED COOLING COILS. THOROUGHLY DEHYDRATED, EVACUATED, CHECKED FOR LEAKS . . . THEN FACTORY-CHARGED AND SEALED UNDER RIGID TEMPERATURE AND PRESSURE CONTROLS.

GENERAL ELECTRIC
Air Conditioning Dept. Tyler, Texas

Wilmington Project--

(Continued from Page 2, Col. 5)

Project" committee, with subcommittees on such specific phases of activity as advertising and publicity, sales training, sales promotion, contact, and builder cooperation.

One of the first steps taken was in the direction of making essential community contacts. The contact committee started with key builders, interviewing them individually in the office of one of Wilmington's leading mortgage lenders, who had been recruited early in the campaign. Builders were asked to offer air conditioning in new homes on a non-optional basis.

These interviews were conducted over a several weeks' period in January and February. Looking back, ARI feels the timing was late. Many of the builders already had their designs chosen for spring, and were reluctant to alter them.

Outcome of the interview activity was that nine builders signed up and committed themselves to the construction of sample homes with "The Crowning Touch" in 15 suburban communities near Wilmington, Newark, and Seaford, Del.

A Wilmington advertising agency, John Gilbert Craig Advertising, Inc., was engaged to handle advertising and publicity. Conditioning, impact, and continuing campaigns were mapped. Publicity was started early and continued throughout the campaign, with all meetings publicized in the local press and photographs taken of model homes in the promotion.

A sales training school was set up to which cooperating builders were asked to send their salesmen to learn modern home-selling techniques under West Coast expert Kelly Snow, who flew in from California for the assignment. Considerable emphasis was placed on this, because it is felt that the average consumer doesn't ask for an air conditioned home—he must be sold one, and unless the salesman "is sold" himself on an air conditioned home, the job won't get done.

SITE SIGN at one of the projects which tied in with the promotion program emphasized that "For healthy happy living" the "Crowning Touch Home" with year-round wholesome air conditioning was the answer.

WEARING THE CROWN which was given to children who accompanied their parents to the new project homes, and also the large button badge worn by realty salesmen which says "Ask Me About the Crowning Touch," Avril Hanning examines the key chain which was given to prospective home buyers who visited homes with year-round air conditioning. These were some of the special promotional items employed in the "Delaware Project."

Air Conditioning Mfrs. Trained 40 New Home Salesmen

Training experts from the staffs of the air conditioning manufacturers were also enlisted in this program. More than 40 new home salesmen attended two full days of classroom training. They were taught to sell benefits, and were shown how they would benefit; they were given equipment explanations; sample customer approaches; and answers to questions that might be asked.

With May 13 as a target date, a kick-off dinner was held at Wilmington's Hotel DuPont with builders, sales people, mortgage officers, and representatives of other related groups invited. When guest speaker Neal J. Hardy, FHA commissioner, told the gathering that "within a few years, any house that is not air conditioned will be obsolete," the committee felt that its project had been given an official blessing.

Teaser Ads Launched Cooling Campaign

A week prior to the target date, the conditioning campaign was launched, with teaser ads appearing in Wilmington newspapers. During this week, builders were readying their sample homes with "The Crowning Touch" for public display, and on the official opening day, May 13, publication of a full-page two-color advertisement in local newspapers signaled the start of the impact campaign. This ad carried full information about the project and listed the participating builders and the location of their home sites.

A series of 60-in. and 30-in. insertions followed in close succession. Simultaneously, commercial announcements were released on five local radio stations (there is no local TV station), and 13 billboards in the Wilmington area carried the message of "The Crowning Touch."

Billboard advertising ceased on June 13, and radio commercials were thinned out as the sustaining phase of the campaign was reached. Beginning June 24, newspaper ads were reduced to 24 in., and run Saturdays in the real estate pages.

In addition to the project committee's own advertising, cooperating builders were encouraged to mention "The Crowning Touch" in their ads, and were provided with mats of the stylized golden crown symbol for their insertion. In mid-June, the *Wilmington News-Journal* newspapers prepared a special real estate section featuring the ARI project.

Builders were supplied with various merchandising aids: site signs to identify sample homes with "The Crowning Touch," lapel buttons for salesmen, paper crowns for children, souvenir key chains for adults, pennants, decals, and other items.

Each of them were also supplied with up to 1,500 copies of a booklet prepared by the du Pont Co., describing the advantages of central air conditioning, and 80,000 copies of this booklet were distributed door-to-door in the Wilmington area in the week before the sample homes were opened to the public.

Most participants made full use of the merchandising aids ARI gave them. With two exceptions, all used site signs, decals, and other identification materials. All but one freely distributed souvenirs to visitors.

Participating Builder Had To Offer Cooling On No-Option Basis

One of the requirements of builder participation in the project specified that "The Crowning Touch" feature be offered on a no-option basis, thus legitimately permitted the builder to advertise central air conditioning at "no extra cost." Most builders went along to this.

However, in one development constructed by Paul-Built Homes, the method used by the builder was to interest the prospect in the home as a basic dwelling unit and then point out that the same home with "The Crowning Touch" was available for a difference of only one dollar a week in monthly payments. This is a development specifically promoted to Negroes, and the builder's total sales of 68 homes with "The Crowning Touch" set a record for the project.

With one exception, all participants reported favorable prospect reaction to the no-option arrangement. They found prospective buyers were not disposed to quibble over the offering.

Two of the builder participants credited their sales force for the successful acceptance of the no-option setup. One builder helped stimulate enthusiasm in his salesmen by paying a bonus commission on every "Crowning Touch" sale. Another, at his expense, conducted a sales training program to supplement the training sessions sponsored by ARI.

From their own observations during the course of the program, builders came up with a variety of ideas and suggestions. Frank Robino, who sold 46 homes with "The Crowning Touch" in two different developments, feels that central air conditioning is a "status symbol" and that the industry could boost sales by devising a visible appurtenance "something like a rooftop TV antenna."

Because he was so convinced of the importance of this, Robino's homes have the condensing unit section installed at the front of the house, in plain sight. He'd like to have a better, more dramatic symbol.

Sees Need To Glamorize Air Conditioning

Ralph Paul, of Paul-Built Homes, thinks air conditioning should be "glamorized," made more appealing to women on a basis other than that of physical comfort. Other suggestions included better communications between program promoters and builders, a larger advertising budget, and a more meaningful theme. In general though, the builders had nothing but praise for the promotion. Said Robino:

"We're going into the biggest year we're ever had, and 'The Crowning Touch' has helped bring this about. Certainly, I would participate again. I would even contribute money to such a program, because I've made money from it."

In mid-June the project committee entertained a delegation of power company executives from various parts of the country, explained the program to them, took them on a tour of the project homes. Many of the visitors indicated that they would give every consideration to supporting similar projects in their own communities.

12 YEARS
and over a
MILLION
UNITS

That's the experience behind Addison's Commercial Line. Since 1949 our facilities have expanded each year to where we now have more than 200,000 square feet of manufacturing area. Addison's know how, experience and fully equipped plants are your assurance of quality products.

ADDISON AIR CONDITIONERS

CONDENSING UNITS—7½ to 20 h.p., multiples for higher ratings • Rugged • Quiet • Weatherproofed • Diagonal coil for minimum plan area • Controls wired and enclosed • Compressor section may be detached • Designed for outdoors.

HORIZONTAL AIR HANDLERS—Sizes to match Condensing Units • For remote installation with ducts or with plenum and 4-way grille as optional extra • Large coil face area for low air velocity and sound level.

THERE'S REAL PROFIT FOR YOU BECAUSE: Addison Commercial Units are between the highly competitive residential market and the big, complex industrial installations. Easy to install • Flexible to meet any conditions—multiples for higher ratings • Quality features to sell customers and keep them sold • Durable, trouble free construction • A price structure that will get business for you, and at a profit.

ALSO: HEAT PUMPS • WATER CHILLERS • ROOF TOP UNITS

MANUFACTURERS REPRESENTATIVES
Some territories still open. Write or call Commercial Division for details.

ADDISON
PRODUCTS COMPANY
101 RAILROAD STREET
ADDISON, MICHIGAN • PHONE LI 7-1200

In Corpus Christi

Hospital Job To Point Up Separate Contract Benefits

CORPUS CHRISTI, Texas—A successful effort to have separate contracts awarded for a hospital addition "will help to spotlight the desirability of letting separate mechanical contracts for all major construction," in the opinion of Gunnar Erickson, executive secretary of the Mechanical Contractors Assn. of Corpus Christi.

The association has been campaigning for some time for the separate-contract idea.

When plans were made known for a 200-bed addition to the Corpus Christi Memorial hospital, the association went to work to try to convince architects and the hospital board that separate contracts should be let.

It was stressed that air conditioning, plumbing, and electrical work would account for about half of the total cost—estimated at $5,500,000—of the project.

Declaring that the single-contract practice was "outdated and outmoded," the group pointed out that when this practice started, the mechanical work in the average building was a minor item in the structure's total cost.

But the percentage of the cost of a commercial or industrial building covered by the three mechanical areas has increased gradually until it now runs between 20 and 40% in general construction and about 50% in hospital work, the association emphasized.

As a result of the group's effort, Erickson indicated, the hospital board advertised for, and let, four contracts—for air conditioning, plumbing, and electrical work, as well as for general construction.

Industrial Sales, Service Firm Organized In Houston

HOUSTON, Texas — Formation of a new Houston firm to handle industrial refrigeration and air conditioning sales and service was announced recently.

The Sandifer Co., 2518 North Blvd., will also handle heating equipment and serve commercial establishments and institutions, R. S. (Bob) Sandifer, owner, said.

Sandifer, a registered professional engineer in Texas and Louisiana, has more than 20 years' engineering, design and handling applied equipment experience in his field.

He was vice president and general manager of Keene-Aire of Houston immediately prior to forming his new company, and is a former Dallas branch manager of York Div. of Borg-Warner Corp.

For Your Reprint Copy

"Emergency Diagnosis, Repair of Hermetic Unit Electric Components," by John L. Zant, mail this ad with your name and address to: Air Conditioning, Heating & Refrigeration News, 450 W. Fort, Detroit 26, Mich.

Only 25¢ each.

Unusual Design Creates Problems

Circular Showroom with Floor-to-Ceiling Glass and 8-Point, Star-Shaped Roof Gets Cooling from Underground Ducts

PARAMUS, N. J.—A circular showroom with floor-to-ceiling glass and an eight-point, star-shaped roof presented a problem for engineers who air conditioned the new Rayco retail store here.

Overhead ductwork was not feasible because of the finished interior of the roof and exposed beams.

The situation was further complicated by a variance in floor-to-ceiling elevation from 14 to 20 ft.

According to Martin Nosenchuk, Rayco director, "The striking architectural design of our sales outlets is a valuable sales tool. Naturally we don't want them marred by exposed air conditioning ducts. Yet with large expanses of glass to invite the customer in, visually and bodily, we know that the sun and cold must be offset by efficient air conditioning, summer and winter."

So, the Benmar Conditionaire Corp. of Clifton, N. J., dealer for Carrier Air Conditioning Co., laid two 14-in. wide ducts in concrete trenches under the showroom floor, extending to form a large V.

From these, eight smaller ducts fan out to the perimeter of the circular structure, where air is diffused through grilles in the floor. The glass walls are thus blanketed with conditioned air, defeating winter down-drafts, it was pointed out by Carrier.

A few side wall registers were fitted in at the rear of the showroom to deliver the large quantities of air necessary to heat and air condition the glass-walled area.

Air enters the ductwork at the apex of the V, at the rear of the showroom, where a 15-ton direct expansion fan-coil unit is suspended from ceiling beams in the shop area.

Recently developed by Carrier, this unit contains the fan motor and filter within the cabinet, so there is no overhang outside. Rubber mounted bearings and internal neoprene coated insulation reduce the sound level, it was explained.

A gas-fired 300,000-Btu duct furnace is attached, adding winter heating to the system. The total area heated and cooled is 3,000 sq ft.

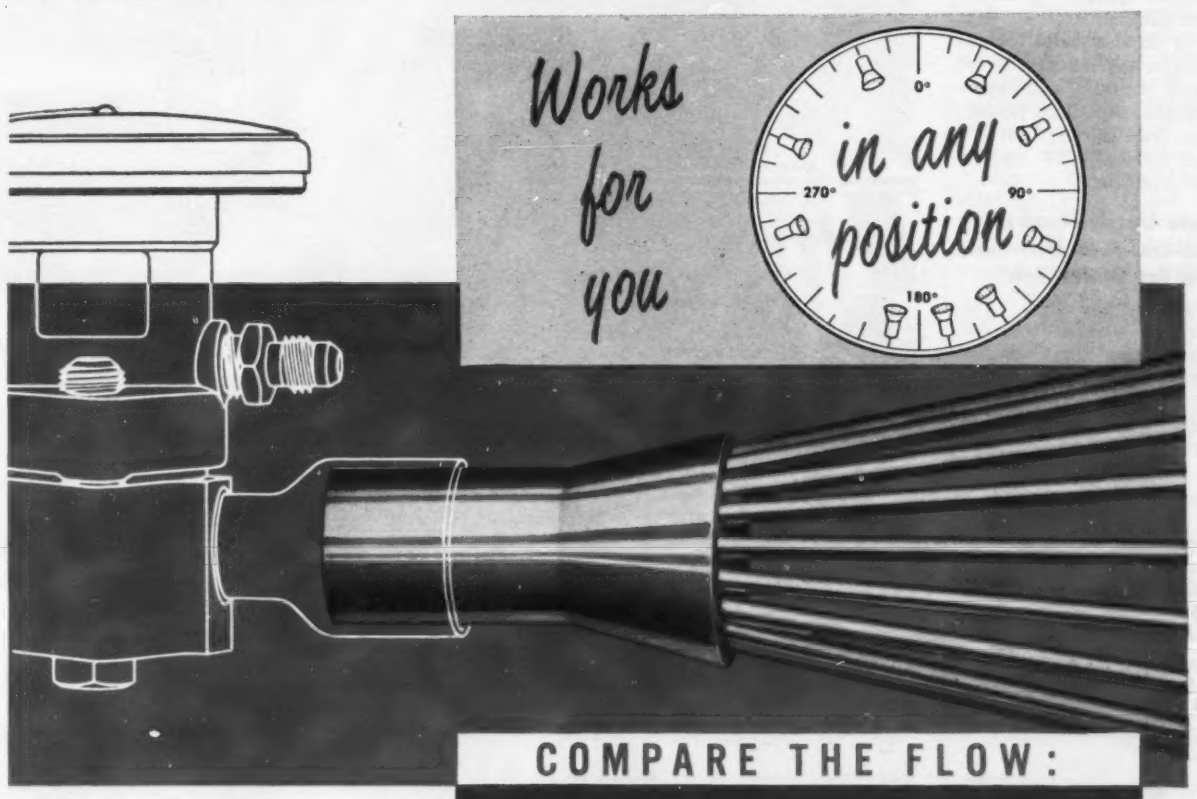
Ductwork serving the shop office, stock room, and waiting room presented more problems to the engineers. Glass panels were required in the waiting room so that the shops could be exposed to the public.

Ductwork here was boxed in to blend with the finish of the building, following the ceiling line between the beams.

Directly above the fan-coil unit, on the roof, is a new low-silhouette, 15-ton capacity Carrier condensing unit. Only 21 in. high, with adjustable legs that can be set at 12 or 18-in. heights, this newly-developed equipment has control box and compressor in a separate section which can be serviced without shutting down the condenser air flow.

CHECK THE ADVANTAGES...THEN SPECIFY • INSTALL

ALCO'S NEW VENTURI-FLO® DISTRIBUTOR



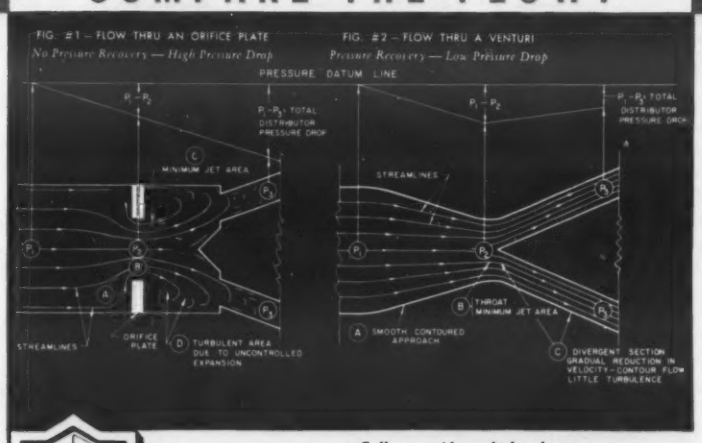
Assures equal distribution to all passes of a multi-circuit evaporator with a low pressure drop.

WIDE APPLICATION RANGE—from 25% to 150% of Rated Capacity.

LOW PRESSURE DROP—permits closer, more economical Thermo® Valve sizing—assures more stable valve control.

ONE PIECE CONSTRUCTION—nothing to come apart, nothing to take apart—*No orifices, plates or nozzles needed* for capacity regulation.

COMPARE THE FLOW:



Call your Alco wholesaler—
write for Specifications Bulletin No. 188.57.

• *BUY SECURITY*
• *BUY QUALITY*
• *BUY ALCO*

ALCO VALVE CO.
8553 KINGSLAND AVE. • ST. LOUIS 5, MO.

8219

The one complete line of refrigerant controls: Thermostatic Expansion Valves • Refrigerant Distributors Solenoid Valves • Suction Line Regulators • Flooded Evaporator Controls and Reversing Valves

Poor Air Distribution = Sick Installation

By Ivan C. Stepnich, District Manager
Penn Controls, Inc.

In a recently observed air conditioning installation, the tar paper wrapped plenum chamber and pipe radiating in all directions could have doubled for a Hollywood model of "The Giant Black Spider From Outer Space." This should have been its application; for as an attic air distribution system, it was a complete flop.

Few installations are as imaginative as this "black spider" case, but too many of them approach its ineffectiveness. The irony in this is that it nullifies the good efforts exerted in design and manufacture of the equipment and components.

Moreover, once a contractor has integrated a poorly designed air distribution system in the building construction, the remedial steps he can take are usually too limited to be effective. In addition he may find himself astride a real tiger in the person of the irate customer. He'd like to jump off, but this might involve greater hazards.

The emerging pattern in case histories of sick installations is one of design procedures based on "rules of thumb," past heating experience, expedient utilization of material on hand, or the downright necessity of making a low bid profitable.

Short Cuts Used Because 'Customers Are Unwilling To Pay for Better Job'

Even among the more successful dealers and contractors, rote rather than right, as delineated by industry manuals, is the procedure used for system design. Short cut methods are condoned by the assumption that the customer is unwilling to pay for the time needed in thorough design.

Short cut methods may have been effective in the good old heating days, as the margin for error was fairly wide and oversizing was not a sin. Because of more exact air requirements, system design for cooling is more critical, and its effect on equipment operation is more complex.

Too Little Air Through Coil

Compressor operation, for example, is directly affected by the amount of air passing through the cooling coil.

The most common field problem is too little air through the coil. This manifests itself in low suction and head pressures and reduced capacity. Coil freeze up is a possibility. Also symptomatic are external condensation and cold air puddling in living areas because of low temperature and velocity air. In addition to possible oil slugging, the hazard of compressor burnout because of short cycling can be a reality.

Although not as prevalent, too much air can be a source of trouble because of possible compressor overload as well as undesirable high velocities, humidity, and noise levels.

To the uninitiated who may consider changes in blower speed as a cure-all, the fan laws may provide a rude awakening. Doubling fan speed, for example, increases the system static pressure or resistance to air flow four times, and it increases the horsepower requirement eight times.

Additional penalty can be imposed on the blower through loss of velocity head because of sharp bends, change in size and shape of ducts and fittings, and in obstructions in the distribution system. The increasing demand for belts, pulleys, and bearings attest to the fact that blowers are being given a good workout in the field.

The popular add-on unit in central home air conditioning presents its share of pitfalls to system design. Additional cooling coil resistance and additional air requirement are factors to be considered. The circulation of 300 to 400 cfm per ton of refrigeration is considered good practice. This in itself does not guarantee a satisfactory job, however.

Inadequate Registers

Cases have been observed where adequate amounts of air through inadequate registers would merely puddle in the room, and the unit would function as a highly successful dog cooler but a mighty poor people air conditioner. Proper air velocity through well selected diffusion registers can do much to minimize the handicap of low sidewall outlets.

The great evil in the add-on field is the temptation to add cooling to any existing warm air system. This, many contractors find irresistible. This has also caused many contractors to pray for October in July.

A better procedure would be a thorough evaluation of blower capacity, register and ductwork capabilities to handle an add-on unit. If this is found wanting, other solutions may be at hand.

With the advent of flexible

insulated duct, completely self-contained units can be installed overhead. The tools needed to make connections are usually a pair of scissors and a screwdriver. This system has the advantage of a completely independent distribution system with supply and return outlets located for maximum effectiveness. Moreover, the nuisance of seasonal blower speed changes and system balancing is eliminated. According to the manufacturer, the installed cost of this type of system is no greater than the add-on.

The greatest harm in cases of poor air distribution is created by the people exposed to it. With the customer this may take the form of reluctance or even refusal to make the final payment. Moreover, instead of a sales stimulating booster, the industry winds up with a sales detracting knocker.

What might be a side effect of poor air distribution is the awakening of individuals to the cherished ailments they attribute to air conditioning. Moreover, one need not leave the industry to find these individuals. An owner of a large wholesale control organization, for example, swears up and down that a sharp pain in his right knee occurs only when he is exposed to air conditioning. An inventory clerk blames her sniffles on air conditioning.

Strangely enough these victims never seem to object to the better air conditioning they find in department stores and restaurants. Therefore it would pay to minimize the complaints of these kleenex-equipped ambassadors of bad will.

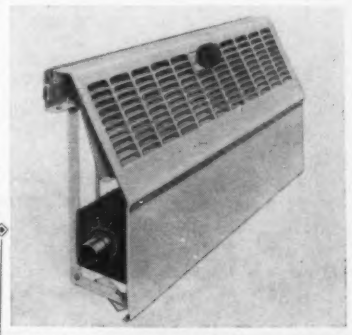
Most of the problems of poor system design can be attributed to a reluctance to utilize the approved industry procedures that have been painstakingly prepared. Certainly the manuals and forms prepared by the National Warm Air Heating & Air Conditioning Association constitute a bible of good practice. These in conjunction with the Silver Shield training program constitute an up-grading influence for the immediate betterment of the entire industry.

It certainly is no reflection on the competence of the dealer or contractor if he does not possess a complete knowledge of the physical laws of air distribution. It is a reflection on his good judgment, however, if he has complete and charted data based on these physical laws and neglects to use them.

New G-B Duct with welded aluminum casing gives you air distribution, thermal insulation, sound absorption, and vapor barrier — all in one economical product!

New G-B Duct is made entirely of high-density fiber glass insulation enclosed in a hardened aluminum casing and sealed by a unique welding process. It is the one product that fulfills all these requirements: • *meets strictest fire codes for commercial heating and air conditioning* • *gives the superior thermal efficiency inherent in high-density fiber glass insulations* • *reduces noise as effectively as 1½" thick duct liner* • *cuts installation cost as much as 50% . . . each 6' section combines thermal insulation, sound absorber, and vapor barrier in one lightweight, ready-to-use air duct* • *provides the same air friction coefficient, diameter for diameter, as bare sheet metal, thus eliminating conversion calculations.* Before you write your next specification, it will pay you to thoroughly investigate G-B Duct. Write for detailed information today.

gb® GUSTIN-BACON Manufacturing Company
218 W. 10th St., Kansas City, Missouri



CUTAWAY view of Modine's new finned tube heating equipment.

Modine Offers New Finned Tube Heating Equipment Line

RACINE, Wis.—Modine Mfg. Co. has introduced a new line of finned tube heating equipment said to be "especially designed to meet the needs of the architect, contractor, and consulting engineer."

In addition to redesigning its finned tube equipment, Modine has adopted new packaging and shipping schedules for the convenience of the contractor.

Upper channels or backplates in 8-ft lengths, brace assemblies, hangers, and heating elements having 50 fins per foot are being carried in stock so they can be shipped in advance of the finned tube enclosures if the contractor so desires. Elements having 40 and 32 fins per foot are available on order.

"Enclosures now have rolled edges and welded interlock channels which eliminate the need for butt trims and screws," the company said. "The left end of one panel fits snugly into the interlock channel on the right end of the adjacent enclosure. This type of construction has a strength equivalent to five vertical stiffeners."

The new line also includes these other features:

"Continuous upper channel so that gussets are not required for hanging dampers or holding rod hangers. Rod hangers now are supported by friction-type clips which can hold against 150 lbs pressure.

"Stronger brace assemblies made of 11-gauge steel.

"New flat-top enclosures on standard units in addition to the slope type of enclosure previously used.

"Greater variety in the length and height of enclosures. Lengths vary from 2 to 8 ft in 6-in. increments. Heights range from 12½ to 24 in."

In addition to the flat-top, slope-top, and Deluxe enclosures, Modine offers a type C cover which has been redesigned for a wider range of low-cost installations. Certain accessories such as end caps and inside corners are available for the first time on this enclosure.

On the other types of enclosures, the full line of end accessories includes wall trim in 3, 5, and 7-in. width; rounded end caps; 90° inside and outside corners with interlocking joints; and access doors with interlock joints.

Inside Dope

By GEORGE F. TAUBENECK

(Continued from Page 1)

conjunctions, and has stolen her older stepsisters' diaries for the years 1948-60 inclusive.

SYRACUSE, N. Y. — Willis Carrier III announces that the contract of Cloud Wampler IV, a math major in Syracuse Junior High, has been stashed away in the company vaults. Young Mr. Wampler, in return, assigned his patents on his half-ounce-per-horsepower air conditioner to the parent company. Terms of the contract were not announced. However, from confidential sources, the NEWS has learned that the Wampler boy was given the *other* half of Syracuse.

NEWS readers are invited to write to the editor giving their opinions on any subject of interest to the industry.

World Series Time

Maris, Mantle & Co. knocked our Detroit Tigers out of the World Series this year. Undaunted, "Dope" presents his semi-annual collection of baseball anecdotes at this propitious moment.

Bullhead McGoon, a National League umpire, was irascible both on and off the field. Regularly he beat up his wife and kicked his small son.

One afternoon a rare thing happened. A Dodger manager complimented him on his ball-and-strike calls!

McGoon went home with a big grin on his ugly puss, kissed his wife, and asked sonnyboy to sit on his lap.

Sonnyboy wanted no part of it.

The son never sits, you see, on the brutish umpire.

"I don't know why I'm hitting better this year," said Dick Groat. "I just keep swinging away and a few more base hits have been falling in on me."—*Los Angeles Times.*

Jackie Robinson heatedly accosted sportswriter Mike Gaven.

"You writers are ALWAYS wrong," Jackie shrilled.

"Like when," Gaven riposted, "we voted you Most Valuable Player?"

There was a day when volatile "Frenchie" Bordagaray literally spat upon an umpire. He was suspended for a month.

"A fine, maybe," he reacted to the press, "but this suspension is more than I expectorated."

Ave Memorium . . . Ty Cobb

Talk about surprises! Cobb was three steps off third. Batter popped up an infield fly, which was caught, routinely, by the second baseman.

Latter saw Ty mosey back and step on third base. So he tossed a leisurely looper to the pitcher, who had turned around to receive it.

Flash! Zoom! Slide! Cobb had scored on an infield fly.

In a New York restaurant Yogi Berra and Ernest Hemingway were introduced by a mutual friend.

"Interesting character," Yogi observed later. "What does he do?"

"Mr. Hemingway is a writer."

"Oh? What paper?"

Enter Castro

Cuban revolutionary Fidel Castro almost was signed as a pitcher by the Washington Senators in 1948. How that might have changed the course of history!

"He had excellent control," recalls scout Joe Cambria, "and I strongly recommended that we sign him. However, the front office thought we had too many Latins on the roster at the time."

Errant southpaw Boots Poffenberger was called into the office of Walter Briggs, Sr., stern owner of the Detroit Tigers.

Briggs confronted him with a private detective's report on Poffenberger's pub-crawling.

"Mr. Briggs, suh," drawled Boots, "you been a-wastin' yoah money. That dick shoulda been shadowin' otha guys on the team. You-all *knows* that I'll be a-carousin' and cuttin' up tetches."

How High the I.Q.?

About rookie Gene Host, pitching coach Willis Hudlin of the Detroit Tigers observed: "He's not exactly a perfect pupil. But he has the physical tools to be great as soon as he starts thinking out there on the mound all the time."

Host objected to this appraisal.

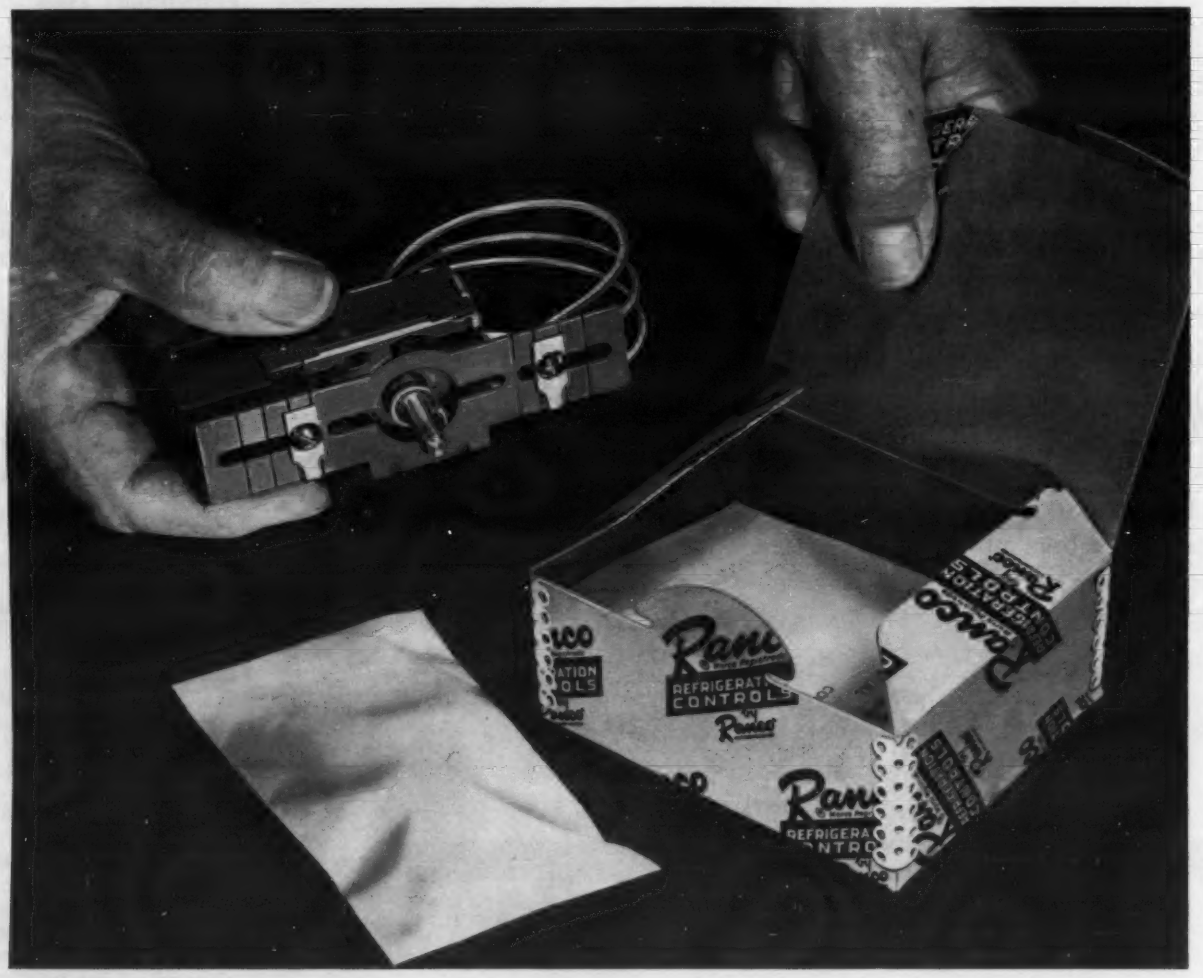
"I'm always thinking when I'm pitching. Maybe I'm not thinking about a particular batter or particular game, but I'm always thinking about something or other."

P.S. Rookie Host will pitch for Charleston this year.

Reverse Twists

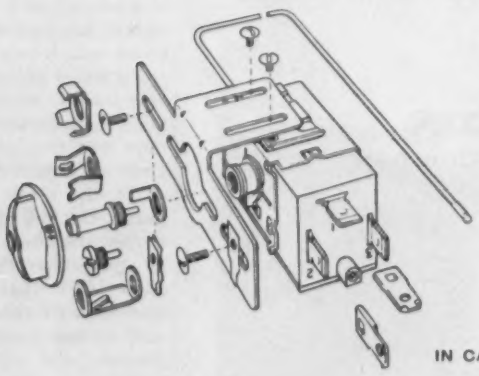
Babe Ruth received almost two bases on balls (2,036) to every strikeout (1,306) in 21 American League seasons.

In his brief career in the National League his strikeouts (24) exceeded his bases on balls (20) for the first time in his career.



NEW A42 ADAPTABLE CONTROL

replaces most constant cut-in controls!



On many constant cut-in control service calls, you're sure of replacement accurately and quickly—right on the spot—with Ranco's new A42. It adjusts to fit most constant cut-in control installations regardless of make. You can adapt the dial shaft to required lengths . . . shape the capillary tube for any requirement . . . adjust mounting brackets . . . add terminal adapter clips if necessary. It's fast and simple. You profit. You save time. Callbacks are eliminated, you service more jobs per day. Add this new A42 to your Ranco replacement inventory and you're set to handle more than 90% of your job calls. See your local wholesaler now for complete details.

RANCO CONTROLS Ranco® INCORPORATED
COLUMBUS 1, OHIO

IN CANADA: RANCO CONTROLS, CANADA, LTD., TORONTO 18, ONTARIO

HOTTEST SELLER in the home-cooling line!

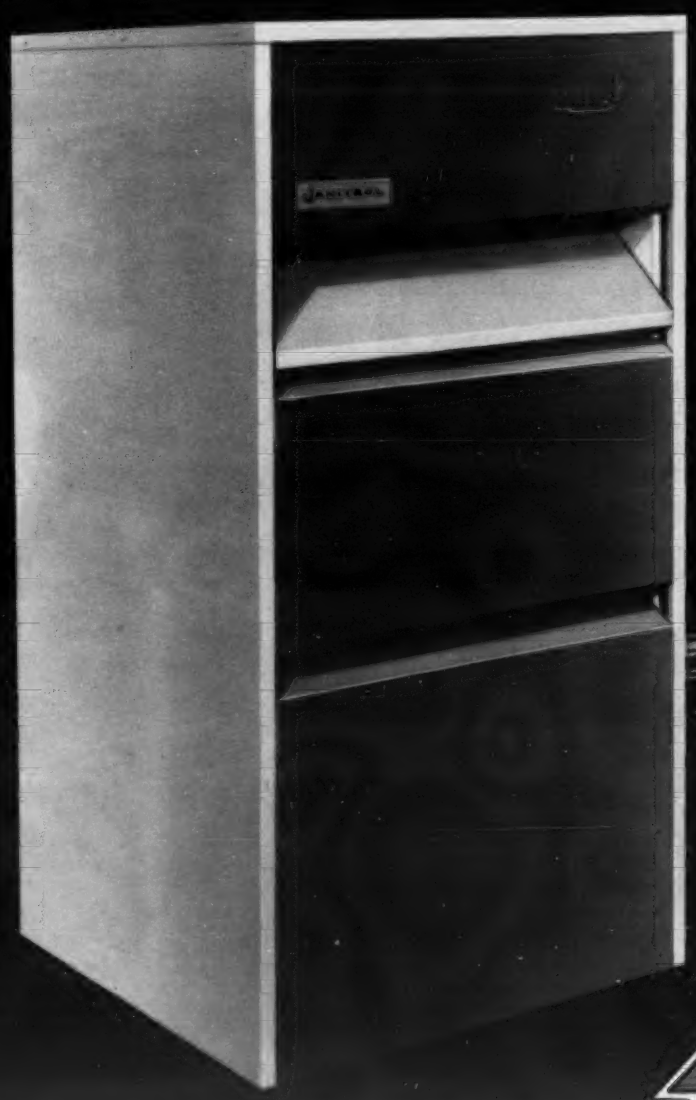
GET RICH
WINDMAKER
ATTIC FAN WITH ALUMATTIC SHUTTER

- Top CFM ratings, size for size
- Rubber-mounted motor, bearings, chassis
- Quiet, efficient operation
- Easiest, quickest installation
- Gray hammertone, red enamel blades
- Guaranteed 5 years (motor, 1 year)
- Priced for your profit

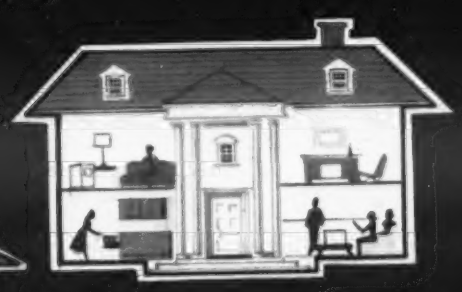
Precision-engineered by
PHIL RICH FAN MFG. CO., INC.
FAirfax 3-9181
2900 CAROLINE • HOUSTON 4, TEXAS

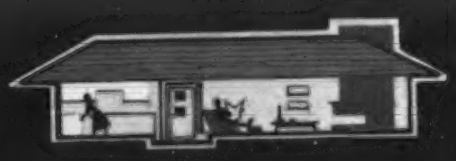
the quality tells . . .
the quality sells

new JANITROL
GAS-FIRED
winter air conditioners



featuring
famous JANITROL
Multi-Thermex
Heating Heart



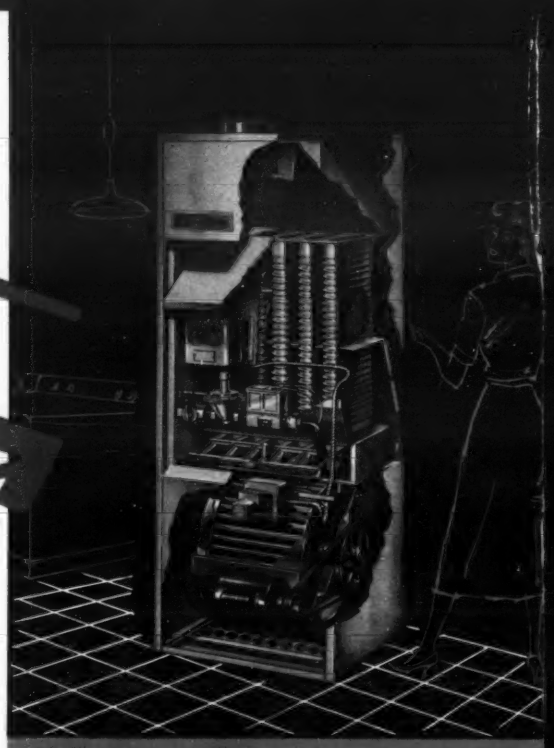


V
C
F
9
5

Janitrol presents... furnaces of the future ...ready now to help you sell and grow!

all new **JANITROL**

Series FVS gas-fired *WINTER AIR-CONDITIONERS*



FVS Winter Air Conditioner with front panels removed to show compact design and complete accessibility.

Loaded with exclusive features no other line in the industry can match... yet priced competitively for volume sales!

The brand of winter air conditioning you choose to sell is vitally important to your income, your future security, your business growth. So it pays to choose wisely, and align yourself with the brand that gives you the most to tell, the most to sell. In winter conditioners, that means Janitrol. A look at the brilliant all-new FVS Series Conditioners for all gases tells you why in a hurry. Never before in heating history has *any* furnace offered so much to help your business grow and profit!

Convertible for full-performance cooling at minimum cost!

In this brilliant new Janitrol FVS Conditioner Series, the *standard blower* size is adequate for cooling in most installations! A damper changeover kit is available to convert rear air deflector from fixed to movable type, and allow cooling air to bypass the heat exchanger.

There's a quality-built **JANITROL** gas-fired winter air conditioner for every need!

The Look of the Future! New slim-trim styling . . . clean, uncluttered, compact. New warm-tone neutral colors to complement the decor of any room, harmonize with other appliances throughout the house.

The crisp, rectangular design and flush front enhance the built-in effect. There are no humps or bulges to waste valuable floor space. Here is simplicity and richness . . . beauty to be lived with and admired.

New Low Overall Cabinet Heights. Only 54 inches for 65,000 to 120,000 BTU models. Only 56 inches for 140,000 through 200,000 BTU models. All models adaptable for High Boy or Low Boy installation at close clearances.

Fully Accessible from Front. All internal parts from blower to heat exchanger are easily reached, simply by removing front panels. Snap-lock panel design. No screws.

All Models through 160,000 BTU Factory Assembled and Wired. Save time and labor on the job.

Matching Outlet Plenum (Optional). Knockouts on front and both sides for use when cutting opening for horizontal duct take-off. Insulated so cooling coil can be added later.

New Quietness in Operation. Acoustically treated blower chamber, cushion-mounted blower and blower motor, full-floating heat exchanger and air-cooled side panels provide a new concept of quiet operation, without annoying vibration and expansion-contraction noises.

Prelubricated Blower Bearings. Randall, "Deep Well Reservoir" sintered bronze type. Without equal for quiet operation and freedom from effects of maintenance neglect. Lubricant supply renewable through drilled and tapped hole made to take a small, collapsible tube of lubricant.

New Dirt-tight Base Plate with Leveling Bolts. Assure easy installation with no grouting necessary. Knockouts for inlet opening in base plate when making a High Boy type installation; also in both side panels.

Multi-Thermex Heat Exchanger. Warranted for 10 years. Welded assembly of 18-gauge tubes and 16-gauge top and bottom tube sheets. Horizontal corrugations in vertical tubes provide 50% more heating surface, maximum heating efficiency. Famous Janitrol Ampli-fire ribbon flame burners, removable in seconds for inspection, or when necessary when changing type of gas . . . no fasteners are used or tools required.

Seven Sizes 65,000 to 200,000 BTU per hour input. FVS 65-85, FVS 80-85, FVS 100-85, FVS 120-85, FVS 140-85, FVS 160-85 and FVS 200-85. All sizes AGA approved against 0.5" W. C. system static to meet new code requirements for units convertible to cooling. Full range of models, AGA approved as "Unit Heaters for non-residential space heating".

Janitrol Horizontal Conditioners

Compact, horizontal forced air winter conditioner may be located in basement, crawl-space or attic. Also approved for use as unit heaters. Thermostat and automatic controls included. Accessory filter assembly. Natural, mixed or LP gases. 65,000 to 150,000 Btu input.

Janitrol Counterflow Conditioners

Especially designed for basementless homes. Insulated for safe zero clearance installation back and sides. Full front access. Thermostat, automatic controls and filter included. Natural, mixed or LP gases. Easily convertible for cooling. 80,000, 100,000 and 120,000 Btu.

Call WESTERN UNION Now!

Address Your Collect Wire to:

HARRY C. GURNEY, General Sales Manager
Janitrol Heating and Air Conditioning
A Division of Midland-Ross Corporation
Columbus 16, Ohio (In Canada: Wire Moffat's Ltd. Toronto 15)

JUST SAY—"Rush me full details on Janitrol Select Dealer Program"

You'll do better by far as a ..

JANITROL
SELECT DEALER

WIRE COLLECT NOW
for proof . . . and a preview of the profitable future that's yours to enjoy!

Acme Introduces Line of Air Handlers Designed for Broad Range of Commercial, Industrial, Institutional Uses

JACKSON, Mich. — Following two years' laboratory and field research and development work, a new, improved line of air handlers designed and engineered for a broad range of commercial, industrial, and institutional applications is announced by Acme Industries, Inc.

These units will heat or cool the air, remove dirt, humidify or dehumidify the air, or serve as simple air circulators when desired. They will operate with either steam or hot water as a heat source, with either a water chiller or a direct expansion coil as a cooling source.

The announcement said the new line incorporates a number of basic engineering improvements and construction refinements desired by architects, consulting engineers, mechanical contractors, and building owners surveyed by the company throughout the country.

The line comprises a total of 37 horizontal, vertical, and multi-zone type units in 14 sizes ranging in capacity from 600 to 44,000 cfm and providing a nominal outlet velocity of 1,600 fpm.

There are 14 horizontal units ranging in size from 2.7 sq ft to 61 sq ft; 12 vertical units from 2.7 sq ft to 41 sq ft; and 11 multi-zone units, with up to 19 individual zones available in the larger sizes.

Designed to meet government specifications covering cfm, dimensions, and design requirements, the air handlers are made of 14 and 16-gauge galvanized metal with 2½ oz of electro-deposited zinc per square foot and feature 1-in. standard fiber glass insulation. No angle irons are used as all sections are made from rolled sheet steel.

Flexibility Noted

"Unusual flexibility to meet virtually any installation requirement has been achieved in several ways," the company stated. "First, from two to four coil sizes in either left-hand or right-hand combinations are available for each size casing. Also, six motor positions and four fan discharge positions are available.

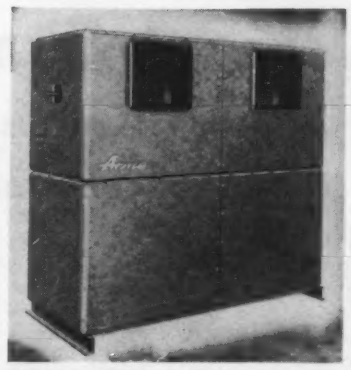
"Fans are mounted on hollow shafts designed and sized to minimize shaft deflection and increase bearing life. Only external, sealed, self-aligning 'Sealtite' ball bearings with 'Alemite' fittings are utilized, permitting lubrication even under adverse operating conditions to simplify service and maintenance.

"Panels, built on specific centers, are securely fastened with self - tapping, hexagon - head screws to prevent air leakage and facilitate quick, easy removal of panels when required.

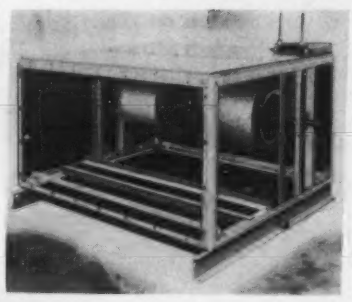
"All engineering and capacity data compiled for both fans and coils, including cfm, static pressure, brake horsepower, face velocities, etc., are based upon the actual performance of these components within the air handlers themselves under typical field operating conditions."

Accessories available for use with these air handlers to meet individual installation requirements include throw-away glass wool and cleanable metal filters, and water spray, steam grid, and steam pan humidifiers. Mixing and filter boxes may be arranged either vertically or horizontally on the multi-zone models.

Deliveries on this new air handling equipment, now in production, can be made two weeks from ordering date, it was stated.



ABOVE is one of 12 vertical units introduced by Acme Industries, Inc. New line also includes 14 horizontal units and 11 multi-zone units with up to 19 individual zones available in the larger sizes.



SIMPLIFIED DESIGN and compact, clean-out construction keynote the new line of air handling equipment for industrial, commercial, and institutional applications developed by Acme. Built on specific centers, panel sections are solidly anchored to base members and structural sideposts of unit.

Thinking of—

- **changing territories**
- **expanding your territory**
- **taking on new lines—**

Check the

CLASSIFIED ADS

Your opportunity may be there.

PENN
Series 219 without external range adjustment.
Series 219 space thermostat with range adjustment knob and integral air bulb.
Series 219 with external range adjustment.
LOOK WHAT'S NEW IN REFRIGERATION
TEMPERATURE CONTROLS
TEMPERATURE CONTROL
Series 239 has both external range and differential adjustment.

Now! Compact size, highly accurate repeat performance, plus other new sales features!

Here's a new line of small, compact, Penn refrigeration temperature controls which has a *wider range* of applications with *fewer models.* The Series 219 has a fixed differential while the Series 239 differential is adjustable. Rated at 16 Amps., these models feature extremely close differential, precision "repeat" accuracy, and are not affected by barometric pressure or cross ambient temperature problems. Extra features include built-in conduit fitting on Series 219, visible linear scale and small bulb size. Closed-tank fittings and bulb wells as well as built-in compensation for ambient temperature are also available. Learn more about these controls . . . write for Bulletin 3270.

PENN CONTROLS, INC. Goshen, Indiana

EXPORT DIVISION: 27 E. 38th ST., NEW YORK, N.Y.

AUTOMATIC CONTROLS FOR HEATING, REFRIGERATION, AIR CONDITIONING, APPLIANCES, PUMPS, AIR COMPRESSORS, ENGINES

Air Movement Symposium

Summaries of Papers and Conclusions Arrived at During 2-Day Symposium Sponsored by Lau Blower

Seventy project and design engineers, representing 38 heating-cooling manufacturers recently attended a two-day symposium at Lau Blower Co. The engineers were exposed to written and oral presentations of basic and applied studies in air movement as related to fans and blowers. Lau engineers reported on laboratory tests, field experience, theoretical analysis in what proved to be one of the most intensive and extensive treatments of air handling ever attended by most of the conferees.

Here are summaries and conclusions from most of the papers presented at the Lau symposium; mathematical treatment has been deliberately omitted from these summaries, but the papers are available from Lau Blower Co., Dayton, Ohio.

"Many times a blower used on a certain furnace will operate satisfactorily, but when used on another furnace of similar size, results are not comparative," said Lau's C. G. Nenadal. "Horsepower requirements might increase, noise may become excessive due to the need for increased rpm and in some cases the required performance cannot be achieved."

Effect of Heat Exchanger Design on Blower

A frequently overlooked reason for such difficulties, Nenadal contends, is the effect of heat exchanger design on blower performance. Besides the normal, considered resistance due to friction across the heat exchanger, there are *shock losses* "which are directly related to the design of the exchanger and to the distance of the exchanger from the blower outlet."

Nenadal went on to describe a study in which he examined the effect of the heat exchanger on blower performance, making it clear that his study did not consider heat transfer; in fact, all the tests were run without the burner operating. Pointing out that although his results are indicative, they cannot be arbitrarily transferred to the myriad of furnace designs, the Lau engineer listed these conclusions from his study:

1) Minimum distance the heat exchanger should be from blower outlet is 2 inches.

2) A near ideal condition would be a 3-in. dimension.

3) Improvements in blower performance can be achieved by an angle design of the heat exchanger in the area of the blower outlet.

4) Improvement in blower performance is conceivable by use of a diffuser from the blower outlet to the inlet of the furnace.

5) It appears that for a given type of heat exchanger, when used across a model line, an equation can be established as an aid for design.

Parallel Application

Some of the problems which are encountered in the parallel application of multiple blowers were described by Burt M. Brown, senior project engineer.

"Parallel operation may be defined as two or more blowers or centrifugal fans, in the same system, each one delivering its own portion of the total air volume. Complete parallel operation means both fans developing a common pressure and having the same system resistance," Brown outlined in laying the groundwork for his discussion.

"Fans in parallel operation may be identical, or they may be of different sizes, or even of different design," the engineer said. "They may operate at the same speed on a common shaft or be individually driven at the same or different speeds. These multiple blowers may be arranged to operate in a common exhaust or supply system. The only basic requirement for complete parallel operation is that the total capacity is the sum of the individual capacities for a given static pressure."

Describing his study, both experimental and mathematical, including extrapolation of a secondary pressure curve for two fans operating in parallel, Brown pointed out that it is possible to have one blower operating in the stable range while the other is operating in the unstable range.

"Since it is possible under such conditions for the blowers to try to switch their respective points of operation, a pulsating situation could exist, resulting in an easily detectable and high objectionable change in sound levels."

While it may not be important in a given situation, it is possible, with blowers operating in the unstable range, that the total air volume might be less than anticipated.

Still another danger of parallel operation in the critical range, Brown stated, is that motors may be overloaded, although overloading is not likely to occur when the blowers are mounted on a common shaft.

In spite of such problems in the application of parallel blowers, the technique has been and can be used successfully, if all such factors are taken into account, the engineer offered. "Some remedies to eliminate dangers:

"1) Select fans of the proper size by using the graphical method.

"2) Select fans operating in the stable area, or to the right of the peak on the static pressure curve. Such a selection can be more readily accomplished by using narrower blowers. The unstable range moves to the left as the blower wheel blade length is decreased.

"3) Select single blowers instead of twin units.

"4) Move the system resistance curve from one point to another by removing restrictions from the system, to change the static pressure condition."

Following a lucid mathematical treatment of resistance in air

GN
Pedrick
SUPERIOR
WHITE
MACHINE WORKS
BURD
GE
GN

handling systems, senior project engineer James R. Ranz offered these comments on resistance and blowers.

"When a blower performance curve is studied, it can be seen that the peak of the curve usually falls near the peak efficiency. Working to the left of this point often results in instability; working to the right of it means a loss of efficiency . . .

"Increases or decreases in rpm make little change in efficiency of the blower if kept within normal limits. Also, changing the rpm will not make a blower unstable, nor will it correct an instability problem. In effect, this means that every blower could be given a value corresponding to the resistance against which it works most efficiently.

"When the resistance of a system is calculated, a blower having a value near this should be selected to assure an efficient application . . .

"Narrowing the width of the blower has a noticeable effect, moving its rpm plot to the left and making it more suitable for a system having higher resistance."

Push-Through Vs Pull Through

Joseph C. Gantner, assistant chief engineer, had some comments about push-through vs. pull-through blower applications:

"It has been intimated, erroneously, that the blower is less efficient when the heat exchanging system or coil is located upstream from the blower (pull-through design). Others have established rules-of-thumb that indicated the need for higher blower rpm and an approximate 20% increase in horsepower for the pull-through unit.

"Assuming that blower efficiency does not change from application to application, it is obvious that some design considerations in the pull-through unit have created additional losses or resistance.

"Examination of the two types of units reveals several differences, with the most outstanding features being the method of discharging the air from the unit. On an outdoor condensing unit, the air is discharged directly from the blower into the atmosphere. A very similar condition prevails where conditioned air from a pull-through evaporator section is discharged into a very large room, with little or no ductwork attached to the outlet.

"The losses incurred under these conditions exceed the losses encountered in the push-through unit of the same rating . . .

"These losses are of a magnitude that definitely creates a demand for the development of higher total pressure from the blower when moving the same volume of air."

SLIDE RULES, pencils, and paper were the tools of the day during the first engineering symposium on air moving sponsored by The Lau Blower Co. at its home office in Dayton. Here, W. F. Kramer, left, K. E. Marsteller, center, and F. J. Fenney, right, all of The Philco Corp., calculate a solution as Harold Farquhar, Lau's chief engineer, lend a hand.

Gantner also commented briefly on studies having to do with the life of smaller belts and pulley being increasingly used on blowers. While admitting that smaller belts and pulley can be used, he warned that the reduction of pulley diameters and resulting reduction of belt length might cause increased belt tension to transmit horsepower requirements; increased load on blower and motor bearings; increased belt load; possible vibration problems; possible increase in field service problems; possibility of closer tolerance demands on purchased parts.

Tip Speed

"It is sometimes advantageous to work with tip speed, rather than rpm, when computing data for a new blower," suggested Donald D. Kinsworthy, project engineer, research.

"If, for example, outlet velocity is a prime factor in blower selection, maintaining a constant tip speed greatly simplifies calculation, because similar blowers operating at the same tip speed will have the same outlet, as well as inlet velocity. This is true," Kinsworthy explained, "because in similar blowers the outlet and inlet areas will vary directly as the square of the wheel diameter, while the cfm at the same tip speeds, also varies directly as the square of the wheel diameter."

Effect of Enclosure

From Lau Blower's Viking Air Products Div., a study by Clifford H. Pountney and Robert L. Shutts on the effect of an enclosure on blower performance resulted in "the development of empirical expressions which describe the effect of blower compartment restriction on blower performance. These equations relate the distances between the various compartment walls and blower to an *effective blower speed.* This is the speed at which a blower would run in an unrestricted environment and obtain identical performance with that produced in the enclosure."

According to Pountney and Shutts, the information they have developed makes it possible to "predict blower performance in various enclosure configurations, determine which direction of airflow gives optimum performance in highly restricted enclosures, and for a given blower compartment size determine in advance whether a narrow blower might be used to better advantage than a full width blower."

The Viking Air Products authors recognized that the trend toward extreme compactness in furnace design has aggravated problems of air delivery from more and more restricted enclosures. "The solution in many cases has been to overcome these restrictions by increasing speed of the blower. However, the attendant increase in noise has brought field complaints."

Pountney and Shutts claim that "over the full operating airflow span of both 9-in. and 10-in. series blowers, correlation between calculated and experimental effective speeds is most frequently within 4%.

Nation's largest manufacturer of heavy-duty and specialized engine parts—

NEW GOULD-NATIONAL ENGINE PARTS DIVISION

In creating its new Engine Parts Division, Gould-National combined under one corporate roof the brands, products, services and facilities of these wholly-owned subsidiaries:

Wilkening Manufacturing Co., Philadelphia, manufacturers of Pedrick® piston rings and castings.

White Machine Works, Eau Claire, Wisconsin, manufacturers of Superior-Arrowhead cylinder sleeves, sleeve assemblies, pistons, piston pins, Burd piston rings, valves and valve train parts, foreign car engine parts and filters.

Gillett & Eaton, Lake City, Minnesota, piston and casting specialists of cast iron, aluminum alloy, Vanasil® aluminum alloy pistons and specialized engine parts.

Arrow Head Steel Products, Howell, Michigan, manufacturers of aluminum pistons, connecting rods and other castings.

Now, Gould-National, the nation's largest producer of automotive replacement batteries, is also the nation's largest basic manufacturer of heavy-duty and specialized engine parts. The Division is the largest one stop source for the most complete line of engine parts available from one manufacturer. It is the only engine parts manufacturer with both iron and aluminum casting and machining facilities.

By utilizing the efforts of one combined sales force, the customer will benefit from greater sales-service efficiency, more concentrated field coverage.

Product improvement will result from the formation of a special team in the Gould-National Engineering and Research staff. It is the Gould-National way of assuring continuing top quality and improved product performance.

New engineering developments, manufacturing and production techniques from all areas within the Division will benefit all customers, no matter what the product may be.

This is the Gould-National Engine Parts Division—the nation's newest parts manufacturing group with over two centuries of combined experience.

Need heavy-duty engine parts? Automotive engine parts? Foreign car engine parts? Parts for such specialized applications as air and refrigeration compressors? Need complete and modern facilities for aluminum and iron castings? If your specifications call for the best of these, if you need them fast and need them right . . . turn to . . .

Superior-Arrowhead and Burd are trademarks of Gould-National Batteries, Inc.

GN

ENGINE PARTS DIVISION
GOULD-NATIONAL BATTERIES, INC.
St. Paul 1, Minnesota

Editorials

Merchandising Arguments, Technical Discussions Center Around Air Handling

At first glance, the subject of air handling would seem to lend itself only to technical discussion. Yet, air handling and discussions about it have had far reaching economic ramifications in the heating-cooling industry.

Consider:

- The growing importance of heating contractors in air conditioning is in large part due to the argument, "We heating people have had years of experience in handling air; to move into air conditioning is merely to install a source of cooling in addition to a source of heating."
- The spirited fight among warm air, electric, and hydronics heating involves the movement of air or not as a major weapon. Is the lack of forced air equivalent to stagnation? Is the natural flow of combustion air to a basement boiler sufficient to make hydronics superior to electric heat in this regard?
- Air conditioning supply air should come from ceiling of high sidewall outlets, heating supply air should emanate from floor or low sidewall registers and diffusers. How many houses have two air distribution systems? In the inevitable engineering compromises, what happens to year-round comfort?
- In larger buildings, how realistic are ventilation codes, outside air requirements? What about high velocity air distribution, the several zoning methods, coil freeze-ups?
- What happens to heating and cooling equipment when air quantities are grossly over or under design specifications?

These are a few of the facets of air handling which generate lively discussions among engineers and sales managers, owners and contractors.

Air handling is an important topic; some of its most critical aspects are discussed in this issue.

'Mental Longevity' or How Long Will Your Conditioner Last?

The last word will probably never be said about the 5-Year Warranty. It has been called a monster; it has been said that the heat pump industry would have died aborning had there not been the 5-year warranty to protect those first brave purchasers who "in reality, were taking part in a massive field test."

Contractors, wholesalers, manufacturers, dealers react differently and emotionally to warranties and all that the word connotes. Pervading all these attitudes, however, is the expectation and desire of the ultimate consumer. What does he think? How long does he think his appliances and equipment should last?

A Chicago *Tribune* survey indicates that consumers expect a longer life from their appliances than manufacturers do. Notice where cooling units fall in this list.

	CONSUMER-EXPECTED LIFE
Air Conditioner	7.8 years
Television	8.6 "
Washing Machine ..	12.1 "
Dishwasher	12.3 "
Clothes Dryer	12.5 "
Vacuum Cleaner ...	13.4 "
Refrigerator	14.7 "
Range	15.8 "
Freezer	16.0 "

One indication from this "mental longevity" is that customers expect repair parts for present refrigerators and freezers to be available in 1976.

TEN year warranty, anyone?

"I have always felt that whatever the Divine Providence permitted to occur I was not too proud to report. The people are not served by pussyfooting, or by that sort of journalism in which nobody will ask who is the editor of a paper or the writer of an article, and nobody will care."—*Charles A. Dana.*

QUES: WHY DOES THIS MAN LOOK SO DISGUSTED?
ANS: HE'S A TRAVELING SALESMAN WHO DRIVES 3,000 MILES A MONTH. THIS TRIP WASN'T HIS IDEA IN THE FIRST PLACE.
FASHION FOIBLES
SPACE MAN
1976
THANK AND A TIP OF THE HAT LO HAT TO L. M. KEARNS, 4541 MULLEN AVE. LOS ANGELES 43, CALIF.
7-18

They'll Do It Every Time

by Jimmy Hatlo

OFF THE CHEST

PROPONENT FOR A CONCEPT

Youngstown, Ohio

Editor:

Your several articles on "Food Store Air Conditioning" indicate the need for a better accepted understanding of the subject.

For the good of the industry and the food store operator, the conflicting viewpoints should be analyzed further and the controversy resolved as quickly as possible.

As spokesman for the industry, you could exert your influence with ASHRAE to explore the subject and cover same in their application manual, or a supplementary bulletin.

I personally am a proponent of the "concept" expounded in your Sept. 12, 1960 issue.

The situation today is that,

(1) The marked variation in air conditioning tonnage recommended by various bidders on the same job, puzzles the prospect. It reflects on the industry.

(2) The buyer usually winds up with a greater investment in oversize equipment, which, when without capacity-reduction of some kind, results in unstable conditions.

ANONYMOUS

'EQUAL TIME' REQUESTED

Halstead & Mitchell
Pittsburgh, Pa.

Editor:

Your July 10 issue reprinted an article appearing in the newspapers wherein a medical doctor stated that a new skin disease had developed due to air conditioning. The bad effects were supposed to be due to excessive drying of the skin.

Long ago I cut out an article —also by a medical doctor— which states the exact opposite and shows the good effects of air conditioning due to *reducing* the humidity.

I think we have the right to defend ourselves and the industry certainly didn't fight much when the article you reprinted appeared in the papers.

I am enclosing a copy of the article mentioned above and hope you will give it "equal time" to our opponent's time.

H. I. SCHMIDT,
Sales Manager

OPEN VS. HERMETIC COMPRESSORS

Frigidaire Products of
Canada, Ltd.
Scarborough, Ont.

Editor:

In your Sept. 11, 1961 issue, on page 23, it is noted that "Hermetic versus non-Hermetic calls per machine show that, over the years, hermetic equipment has consistently required fewer calls than open-type equipment."

Since these records were compiled by I.B.M. analysis on 9,924 hermetic units and 4,592 open ones, the service calls per machine cannot be disputed. On the other hand, it would be very interesting to know the cost of the smaller number of service calls on the hermetics compared with the cost of the service calls on the open-type machines when it is considered that when one hermetic compressor motor burns out or the compressor seizes, the cost of the service call is many times that on the open-type unit where the compressor doesn't even know it has a motor connected to it in the event of a motor burnout. All we know is that there has been a marked trend of the large supermarkets in Canada to swing back 100% to the open-type machines.

J. H. CAIRNS,
Commercial Sales Mgr.

AIR CONDITIONING HEATING & REFRIGERATION NEWS
F. M. COCKRELL, Founder

'The Conscience of the Industry'

GEORGE F. TAUBENECK, *Publisher*
EDWARD L. HENDERSON, *President*

PHIL B. REDEKER, *Editorial Director*
FRANK J. VERSAGI, *Editor*
C. DALE MERICLE, *Associate Editor*
JOHN O. SWEET,
HUGH T. MAHAR,
GEORGE M. HANNING, *Assistant Editors*
TERRY TREIBER, *Editorial Assistant*
JOHN MacLEAN, *Research & Prom. Dir.*
ROSALIE ASHLEY, *Circulation Mgr.*
DELORIS KROL, *Subscription Mgr.*
EDITH KING, *Reader Service Mgr.*

ROBERT M. PRICE, *Vice Pres. & Sales Director*
ALLEN SCHILDHAMMER, *Vice Pres. & Adv. Mgr.*
REX SMITH, *Western Adv. Mgr.*
FRANK L. TAYLOR, *Eastern Adv. Mgr.*
WALTER J. SCHULER, *General Production Mgr.*
ALICE M. BARROW, *Adv. Production Mgr.*

ADVERTISING OFFICES

New York	Detroit	Chicago	Los Angeles
521 Fifth Ave.	450 W. Fort St.	134 S. LaSalle St.	4710 Crenshaw Blvd.
MU. 2-1928-9.	WOodward 2-0924	FRanklin 2-8643-4	AXminster 2-9501
Robert M. Price	A. Schildhammer	Rex Smith	Justin Hannon
Frank Taylor	Charles Pokorny	Dave Ryden	

SUBSCRIBERS IN 83 COUNTRIES

Member, Audit Bureau of Circulations. Member, Associated Business Publications.

Published Every Monday by BUSINESS NEWS PUBLISHING CO., 450 W. Fort St., Detroit 26, Mich. Telephone Woodward 2-0924. Subscription Rates: U. S. and Possessions and Canada: $6.00 per year; 2 years, $9.00; 3 years, $12.00. All other countries: $10 per year. Single copy price, 40 cents. Ten or more copies, 30 cents; 50 or more copies, 20 cents each. Send remittance with order.

TECH CENTER

by
FRANK J. VERSAGI

Air Movement, Air Handling Dictionary

In air handling, as in so many other things, misunderstandings and errors frequently can be traced to confusion over terminology, over the meaning of words. One industry association, for example, recently pointed out the difference between a register and a grille. It defined a register as an outlet mounted on an inside wall. A few paragraphs later, the same article expounded the argument that an effective heating system should have a "register under every window."

Conventional usage frequently tends to blur distinctions between terms. Nevertheless, from several industry sources, here are definitions of important terms having to do with air movement and air handling.

SUPPLY OPENING or OUTLET — any opening through which air is delivered into a space which is to be conditioned by heating, cooling, ventilation, humidification, etc.

EXHAUST OPENING or RETURN—any opening through which air is removed from a space which is being conditioned.

GRILLE—strictly speaking, a grille is a covering for any opening through which air passes. There is a tendency to use the term to refer to exhaust openings only, since these almost never have directional control of air movement.

REGISTER—a grille equipped with a damper or control valve.

DIFFUSER — an outlet discharging air in several directions.

CORE — that portion of the grille between its margins through which air passes.

FACE — the front side of the core of an outlet.

FACE VELOCITY — the average air velocity over the face of an outlet. Also called *outlet velocity.* Velocity is measured in the plane of the opening.

TERMINAL VELOCITY — The average air stream velocity at the end of the throw.

THROW (or BLOW) — The horizontal or vertical distances an air stream travels on leaving an outlet before the maximum velocity is reduced to 50 fpm.

DAMPER—a device used to vary the volume of air passing through a confined cross-section by varying the cross-sectional area.

INDUCTION (or ASPIRATION) — the mixing of primary air with induced air near the face of the diffuser.

PRIMARY AIR — the air delivered to the outlet by the supply duct.

SECONDARY AIR—the air induced between the outlet and the end of the throw.

INDUCTION UNIT—an induction device, usually located under a window, containing heating or cooling coils through which secondary air is drawn by jet action of the primary air within the unit.

ENVELOPE—the outer boundary of an air stream moving at a perceptible velocity.

TEMPERATURE DIFFERENTIAL—the difference in temperature between primary and room air.

DROP — the vertical distance that the lower edge of the air stream falls between the outlet and the end of its throw.

RISE—the converse of drop.

Just looking at these terms gives a good idea of the many factors which go into designing a good air distribution system, whether it be for a four-room house or a multi-story building.

How fast can the air enter the occupied areas? Location and selection of the many types of outlets. Volume of air, ventilation requirements, balancing the system, sound levels, all these must be considered if optimum performance and comfort are to be attained.

Future Tech Center discussions will explore in more detail some of the principles and practices in air handling.

So. Calif. ASHRAE Hears Loren Crow

LOS ANGELES—"Evaluated weather data for cooling equipment design" was presented to Southern California Chapter of the American Society of Heating, Refrigerating & Air-Conditioning Engineers at the September meeting in an illustrated talk by Loren W. Crow.

Crow is a certified consulting meteorologist and has his own office in Denver. He formerly was with Krick & Co. Associates of Denver, has served as consultant to Fluor Products Co.

New chapter officers are: president, John C. Hall; vice president, Lee Hutchinson; Secretary, John R. Hall; treasurer, Val J. Burke; and the board of governors: Albert A. Hellman, Paul A. Van Woerkom, and Melvin Kodmur.

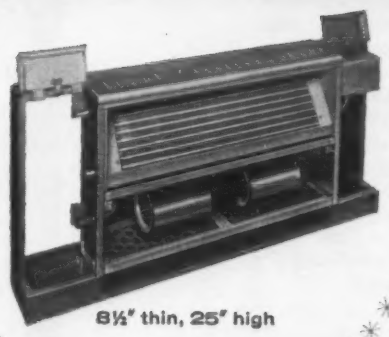
Get your copy

Operating Costs of Residential Air Conditioning and What This Means to Dealers and Installers. By R. A. Gonzalez—25¢ each.

Mail this ad with your name and address to: Air Conditioning, Heating & Refrigeration News, 450 W. Fort St., Detroit 26, Mich.

Extra large piping compartments, 8½" thin design, complete slide-out fan deck assembly, motor disconnect plug, field reversible coils, full rated capacity and day-to-day quiet, efficient operation . . . these are but a few of the many reasons why so many engineers, contractors and building operators are specifying and installing McQuay thin-line design, individual room Seasonmakers.

Availability in four types and seven sizes and faster, easier installation make them preferred for apartments, hotels, motels, offices or any installation utilizing a central station heating and cooling system. Hideaway and ceiling models range from 220 to 640 cfm. Floor and basic models from 220 to 1240 cfm. Contact your local McQuay representative, or write McQuay, Inc., 1607 Broadway Street N. E., Minneapolis 13, Minnesota for detailed specifications.


8½" thin, 25" high

McQuay Means Quality

McQuay INC.
AIR CONDITIONING • HEATING • REFRIGERATION

Proper Air Distribution May Mean Use of Zoning—Here Are 5 Ways To Accomplish It

Poor air distribution can undo the effect of the most carefully designed cooling or heating plant — small or large, industrial, commercial, or residential.

And there are times when proper air distribution means **zoning.** By definition, zoning is the division of the conditioning or heating system into sections to permit independent control of room conditions in the zone served by each section, whether the load in this section is fluctuating or steady.

All zoning methods are costly and the designer must justify in his own mind that the added expense is compensated for in improved performance.

This technique may be required where building exposure, orientation, or usage is such that the conditioning system must compensate for fluctuating or steady loads which are independent and unrelated, and occurring in different portions of the building. As an example, office buildings, during mild winter weather, spring or fall, may require cooling on the sunny side and heating on the shady side; this is accomplished efficiently only by zoning.

There are five basic methods of zoning air distribution in an air conditioning system:

1. separate system for each space,
2. simple reheat system,
3. separate recirculating fans system,
4. volume control system,
5. double duct system.

Basic characteristics of these five systems are described in an Application Manual issued by York Corp., and the information in this article is derived from the York publication.

1. SEPARATE SYSTEM FOR EACH SPACE

While obviously offering maximum flexibility, the separate system for each space technique must be sized for maximum design load of each zone so that the total for all zones is larger than central station apparatus capacities sized only for the building simultaneous maximum design load.

Where hot or chilled water is the heat transfer medium, and is zoned, simultaneous heating and cooling of different zones is independently possible.

The separate system may be adapted to central station equipment where one central station serves areas on one or several floors having nearly uniform load characteristics — this fact allowing them to be combined to constitute a single zone.

Forced air heating or direct radiation heating (with tempering of ventilation supply air) may also be adapted to the separate system of zoning.

High in first and maintenance costs, the separate system's ability to meet load variations tends toward economical operating costs when power, steam, and water are considered.

2. SIMPLE REHEAT SYSTEM

In the simple reheat system of zoning, the air is cooled sufficiently to satisfy the space having the most rigorous requirements, then reheated for other spaces.

The reverse may be accomplished with **recooling.**

Reheat is accomplished by steam, electricity, gas, or condensing unit hot gas. Since this system consumes energy in removing heat from the air and then consumes more energy in adding heat back into the air, it is somewhat wasteful.

Condenser reheat method is the least wasteful since it wastes compressor power only.

Capacity and power requirements of the reheat system refrigeration plant must satisfy the sum of the maximum peak loads for the individual spaces rather than the maximum peak of the building, and no compressor capacity reduction is possible as internal sensible load decreases.

Advantages of the simple reheat system are excellent flexibility under varying loads, simple and positive control. The method is most suited to industrial applications where benefit to product or process often overcomes operating and first cost objections, and where power and steam costs are relatively low.

3. SEPARATE RECIRCULATING FANS SYSTEM

In this method of zoning, a central station conditioning apparatus supplies air to multiple recirculating fans, one to each zone.

Automatically controlled mixing dampers mix the correct proportion of conditioned and recirculated air to meet the zone load requirements. Heaters may be supplied at the zone fans for refinement of summer zone control by reheat, but this is seldom done on comfort jobs since satisfactory control is usually obtained by by-passing action of increased recirculated air under reduced loads.

Zoned winter heating may be obtained by building direct radiation with tempering of the ventilation supply air at the main conditioning apparatus.

This recirculating fans system is quite flexible in meeting fluctuating loads and offers the major feature of the separate system for each space while having a lower first cost usually. The system has been successfully applied to large office buildings.

One objection to the system is that while total air supply remains constant, ventilation air decreases as the conditioned air mixing dampers throttle on reduced load.

Space limitations often hamper effective filtering of recirculated air. And the added cost of filters to provide sufficient filter area to permit recirculating or

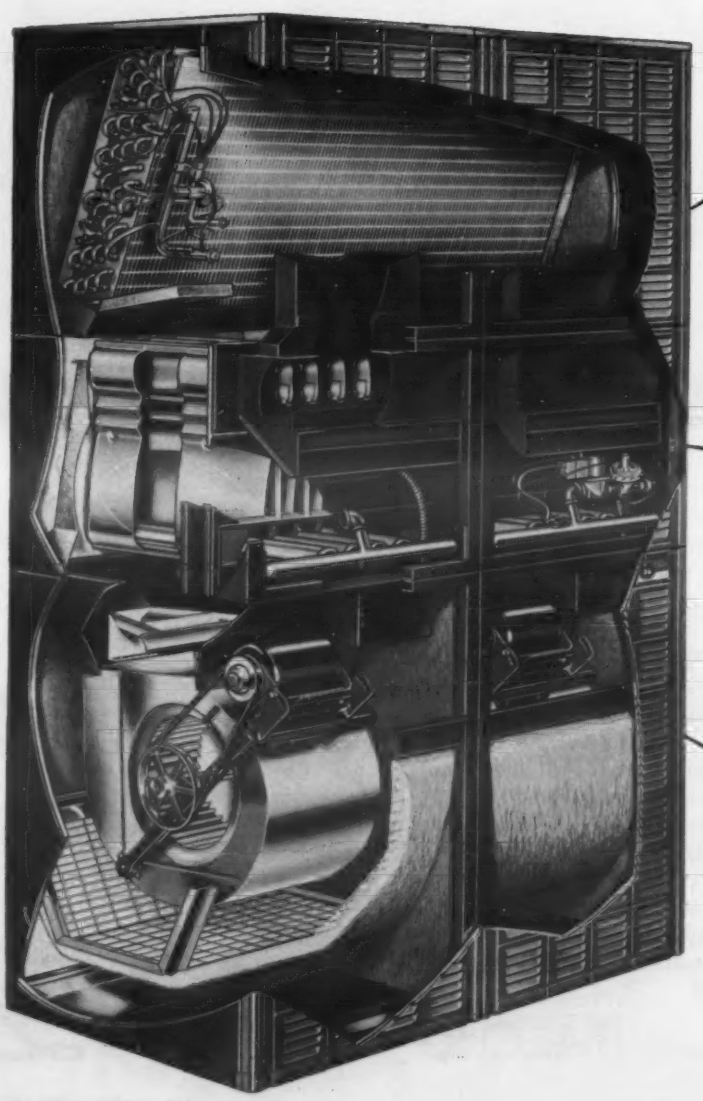
Get your copy

Operating Costs of Residential Air Conditioning and What This Means to Dealers and Installers. By R. A. Gonzalez—25¢ each.

Mail this ad with your name and address to: Air Conditioning, Heating & Refrigeration News, 450 W. Fort St., Detroit 26, Mich.

AIR HANDLING

THE PERFECT BLEND OF HEATING AND AIR CONDITIONIN



COOLING SECTION

Extra large Lennox cooling coils are unequaled in the industry. Fins are made of extra hard aluminum, rippled at the edges for additional strength. Fins and tubes are bonded in a manner that assures tighter contact than on other coils—provides fast, efficient heat transfer. Individual units in sizes from 2 to 10 tons—may be grouped to get ANY capacity needed.

HEATING SECTION

Aluminized steel—more durable than ordinary or ceramic coated steel. "Torture-tested" and built to last years longer. Choice of fuel and heating capacities to suit every job requirement. Sizes for each individual section: 68,000 to 340,000 Btuh gas input; 91,000 to 350,000 Btuh oil input. Also available in electric resistance units and heat pumps.

BLOWER/FILTER SECTION

Floating action of the HUSHTONE™ 12" blower makes it the most quiet air mover ever put in a heating and air conditioning system. Complete assembly is mounted on soft, resilient rubber to soak up sound vibrations. Special motor-drive kits make RIGHT hp and cfm selection easy! Capacities from 800 to 4400 cfm for single and double blower sections. Note bonus-size, wrap around filter for more effective and economical dust removal.

by-passing at reduced load is frequently an economic objection.

4. VOLUME CONTROL SYSTEM

Here is a very simple method of zoning merely by throttling the air supply to a zone or space with an automatic damper. In combination with the third method, volume control has proved successful for handling major variations in load and temperature regulation.

In one type of combination, the recirculating fans serve all the zones on a floor—one or two fans to a floor — with volume dampers accomplishing the individual area zoning required on each floor.

Heating by zoned direct radiation with tempering of supply air for ventilation is recommended for volume control systems.

If summer reheat is desired, heaters must be installed at the volume dampers.

Lower in first cost and comparable in operating cost to other methods, the volume control system nevertheless suffers from inherent disadvantages which must be considered:

A. ventilation is reduced with supply air reduction as the load falls off,

B. less dilution effect on room odors like tobacco smoke,

C. throttling of the air disturbs distribution — often making occupants aware of changes because of alterations in air motion or noise level,

D. outlet grille velocity reduction decreases throw and may cause the cooled air to drop into the occupied zone, creating a draft,

E. requires the complication of static pressure regulation at the fan to prevent increased air volume in one zone as a result of throttling in another.

Volume control systems have been most successful where the design contemplates the volume dampers compensating for minor load variations only, with volume regulation limited by stops on the dampers to 25-33% maximum reduction. With volume control, air cooling and refrigeration capacities can be sized for the entire building maximum simultaneous load.

5. DOUBLE DUCT SYSTEM

Rapidly increasing in popularity, the double duct system of zoning consists of two supply ducts carried to each zone or individual space, one supplying cooled air and the other warm air — with automatic mixing dampers at the supply outlets. The two ducts are served by central station heating and cooling plants, either with separate fans or with a single fan blow-through system.

Static pressure regulation at the fans is required.

Although relatively more costly than other systems, performance of the double duct system is such that it is highly recommended for multi-room applications, since its flexibility allows it to carry the extreme application of control for each space, saving operating cost.

Supply and ventilation air quantities are approximately constant at all loads, and effective filtering of all air is practical. Simultaneous heating and cooling of different zones or spaces is possible, and summer reheat is readily available.

Thermostats controlling the mixing dampers need not be reversed in changing from heating to cooling, or vice versa.

Air cooling and refrigeration plant capacity is determined by the maximum simultaneous building load, rather than the sum of maximum zone loads.

a la carte!

WITH "TAILORED" BLOWER CAPACITY

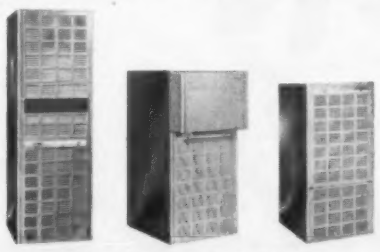
LENNOX

Landmark®

Now you can engineer a system exactly the way you know it *should* be engineered. No more compromise with wrong air volume . . . blowers that fail to measure up in performance . . . or heating/cooling combinations that don't quite "jibe."

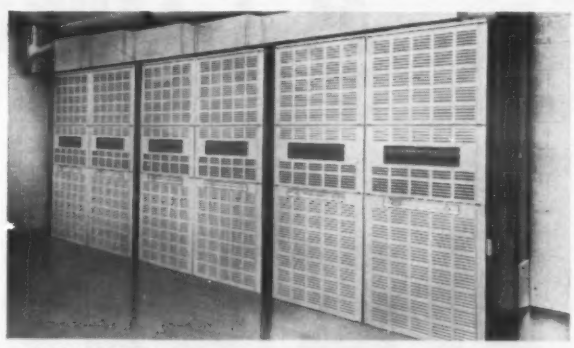
You can *choose* your heating fuel (gas, oil, electric or heat pump) and even combine the LANDMARK units with fresh air damper sections to handle ventilation (and cut cooling costs substantially). Installations may be either ducted or free standing. Easy to install in multiples for larger commercial jobs.

All this versatility is wrapped up in the most durable, handsome and quiet "dress" on the market. Husky commercial quality makes LANDMARK ideally suited for deluxe home application. Write your nearest Lennox factory or LENNOX, 412 S. 12th Street, Marshalltown, Iowa. No obligation.



AVAILABLE IN UP-FLO, DOWN-FLO AND LO-BOY MODELS.

Typical LANDMARK year-round installation in office



Multiple LANDMARK units combined with ventilating dampers

Don't be satisfied with less than

LENNOX

HEATS, COOLS, TREATS AND MOVES AIR

IN HOMES IN CHURCHES IN SCHOOLS IN COMMERCE

LENNOX INDUSTRIES INC., EST. 1895 — MARSHALLTOWN, IOWA; COLUMBUS, OHIO; SYRACUSE, N. Y.; DECATUR, GEORGIA; FT. WORTH, TEXAS; SALT LAKE CITY, UTAH; LOS ANGELES, CALIF. LENNOX INDUSTRIES (CANADA) LTD. — TORONTO, MONTREAL, CALGARY, VANCOUVER, WINNEPEG

Koton, Donovan Organize Consulting Firm

WEST HARTFORD, Conn. — Announcement has been made of the formation of a new consulting engineering firm, Koton & Donovan.

The company, with offices at the Crossroads Plaza, here, will specialize in mechanical and electrical engineering in the air conditioning, refrigeration, heating, plumbing, and electrical fields, it was explained.

Jacob Koton was graduated from the Munick Institute of Technology and holds the degrees of Diplom Ingenieur and Canditat in Mathematik. He was manager of production at the Middle East Tube Co. in Israel and a lecturer at Technion Haifa. He has also been an instructor at the University of Hartford and headed Jacob Koton Associates, a mechanical and electrical engineering company.

Koton is a member of the American Society of Heating, Refrigerating & Air Conditioning Engineers and the Society of Professional Engineers. He is licensed as an engineer in Connecticut, New York, Massachusetts, Rhode Island, and New Hampshire.

William J. Donovan was graduated from Webb Institute of Naval Architecture and received his Master of Science degree from Massachusetts Institute of Technology. He was formerly director of engineering for Bush Mfg. Co. Most recently he has headed Donovan Associates, a manufacturers' representative organization specializing in refrigeration and air conditioning products.

Donovan is a member of ASHRAE and chairman of that organization's technical committee on cooling towers and evaporative condensers. He is licensed as an engineer in Connecticut and New York.

Distributor Sales Down 4% In July, Census Bureau Says

WASHINGTON, D. C.—Sales of air conditioning and refrigeration equipment and supplies distributors were down an average of 4% in July from a year earlier, according to the latest monthly wholesale trade report of the United States Census Bureau.

The distributors' sales for the first seven months of 1961 declined 7% from the like period of 1960. Their end-of-July inventories were 3% less than a year earlier and 1% less than a month earlier.

July sales of plumbing and heating equipment and supplies distributors were 3% better than in the same month of 1960 but 11% below the June total. Their sales for the first seven months of this year were 4% under the corresponding period of 1960. Their inventories on July 31 were down 3% from a year earlier and 1% from a month earlier.

ADD-ON COOLING

Factors To Be Considered To Get Proper Performance, Including Data on Ducts and Blower Systems (1)

This informative discussion of the factors to consider when adding cooling to an existing heating system was written by Robert Mees, technical training supervisor of Janitrol Heating & Air Conditioning, Columbus, Ohio. Mees begins the discussion by listing the questions which must be answered if the add-on job is to perform properly.

1. How much cooling is required—expressed in tons?
2. Are the existing ducts, both supply and return, adequate for cooling (since more air is needed to cool than to heat a house)?
3. Will the furnace blower deliver this required additional air volume against the increased resistance to air flow imposed by adding cooling coil to system?
4. Is the existing blower motor big enough? How do we find this out?
5. If it is not big enough, how do we select one that is big enough?
6. Are existing registers located properly for best cooling results?
7. What type of register is being used? Will they give satisfactory results on cooling?
8. Is the existing electrical service adequate for the increased load imposed by the addition of the cooling unit?
9. Where should the condensing unit be installed? What precautions should be observed in selecting the location?

Using the practical approach, let us attempt to answer each of these.

How much cooling is required?

The answer to this question is determined by the heat gain of the structure. The heat gain is determined by many factors, some of which are building construction, outdoor daily temperature range, indoor to outdoor temperature difference, humidity conditions for the section of country involved, humidity load conditions within the building, occupancy load, orientation of building.

The complete answer to this question can be found by using National Warm Air Manual 11 for Design and Installation of Residential Summer Air Conditioning.

Are existing ducts, both supply and return, adequate for cooling?

As a rule, so-called small pipe systems, 4-in. round or smaller, do not convert to cooling without extensive revisions in the form of additional supply runs and registers. This is because the needed air volumes for cooling cannot be obtained without unusually high blower speeds, motor horsepower, and duct velocities resulting in an unacceptable operating noise level.

Will the furnace blower deliver the required additional air volume against the increased resistance to air flow imposed by adding coil to system? Is the existing blower motor big enough? How do we find this out? If blower motor is not big enough, how do we select one that is?

The first step in determining whether any system is adequate is to determine the maximum heating air volume in cfm. This can be done rather simply:

Close the motor pulley completely.

As accurately as possible set the furnace to rated input.

Next, measure the heating temperature rise at equilibrium conditions and difference between supply and return temperature, just as we do in CAC adjustments.

Next, using this formula, calculate cfm.

Cfm =

Input Btu Per Hour × % Eff. Assume 77%.

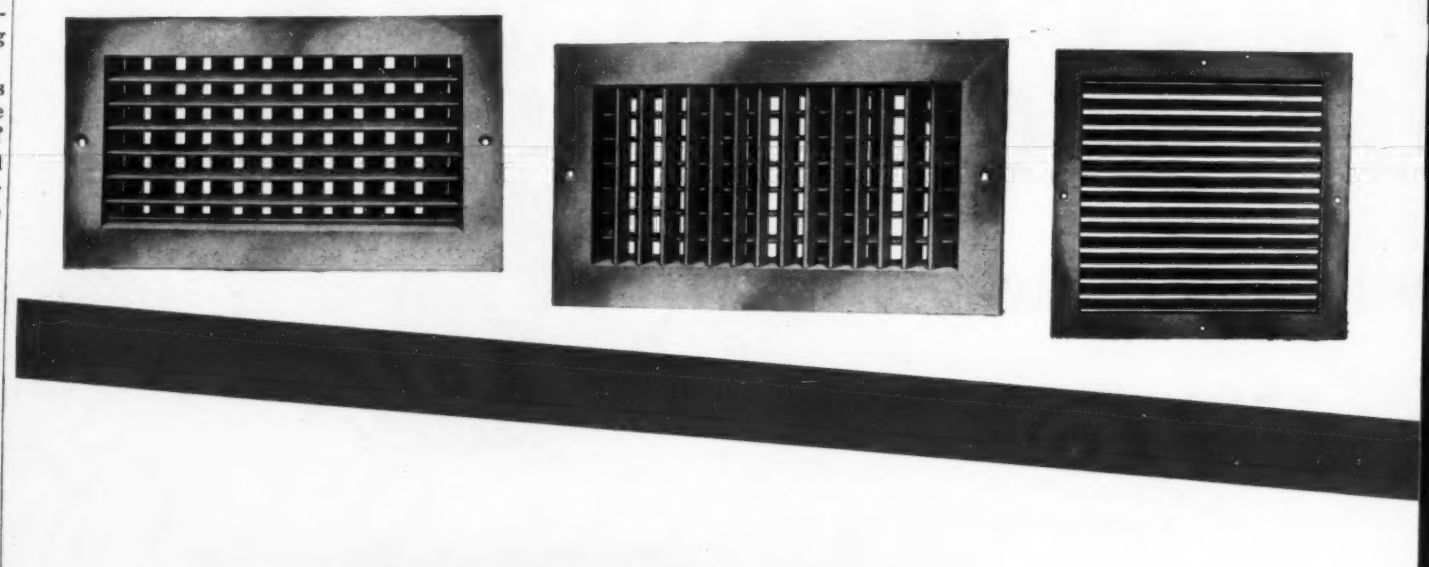
1 08 × Temperature Rise.

The factor of 1.08 in the above formula should be used for near sea level altitudes.

For greater altitudes use a factor from the table closest to the actual altitude for the locality involved. Thus for an altitude of 5,000 ft, the factor would be .90. An error of several hundred feet will make little difference.

Altitude	Factor
Sea level	1.08
1,000 ft	1.04
2,000 ft	1.01
3,000 ft	.97
4,000 ft	.94
5,000 ft	.90
6,000 ft	.87
7,000 ft	.84

An amperage reading of the blower motor under these load conditions should also be made. Be sure all access panels are in place when the reading is made. This reading compared to motor name plate amperage will give clue to how heavily motor is



PRESENTING
A COMPLETE
NEW LINE

Motor Pulley (Fully Closed) Approx. OD	Blower Pulley OD	Blower Speed When Used with 1,750 Rpm Motor	Rpm Change/Turn
3″	8″	650 Rpm	45
3″	7″	750 Rpm	50
3″	6″	875 Rpm	60
3″	5″	1,050 Rpm	70
4″	6″	1,160 Rpm	60

loaded for maximum heating cfm.

In most cases the pulley combinations furnished for heating will not be adequate for cooling. On larger furnaces however they may be adequate.

Next measure the diameter of the blower and motor pulleys and record.

Using the following formula determine blower rpm.

Blower rpm =

Motor Speed* × Pulley Diam.

Blower Pulley Diam.

*Taken from motor name plate.

At this point you should have

1. Maximum heating system cfm.
2. Amperage reading for this cfm.
3. Blower speed for this cfm.

Next step is to determine cfm required for cooling. Using rule of thumb of 320 to 400 cfm for each 1 ton of cooling capacity, an average of these limits would be 360 cfm/ton, a good practical value.

Total cooling cfm required = **Tons of cooling × 360 cfm per ton.**

Next we have to determine how much we need to increase the blower speed to deliver the additional cfm. We will ignore system static pressure for the moment.

Cooling rpm =

Cooling Cfm required × Max. Heating Rpm ÷ Maximum Heating Cfm.

This will give us an rpm that will provide the approximate cfm required for cooling.

Next we must determine pulley sizes required to give cooling rpm.

Using table at left, pick pulley combination that will give rpm close to that required, then select the next higher combination.

Now we have a new approximate rpm and a pulley combination that will put us close to that required.

Using the following table select a new approximate motor size that should be adequate for normal systems.

2-Ton Cooling ..... ¼ Hp
3-Ton Cooling ..... ⅓ Hp
4-Ton Cooling ..... ½ Hp
5-Ton Cooling ..... ¾ Hp

The final motor horsepower will be determined by amperage readings.

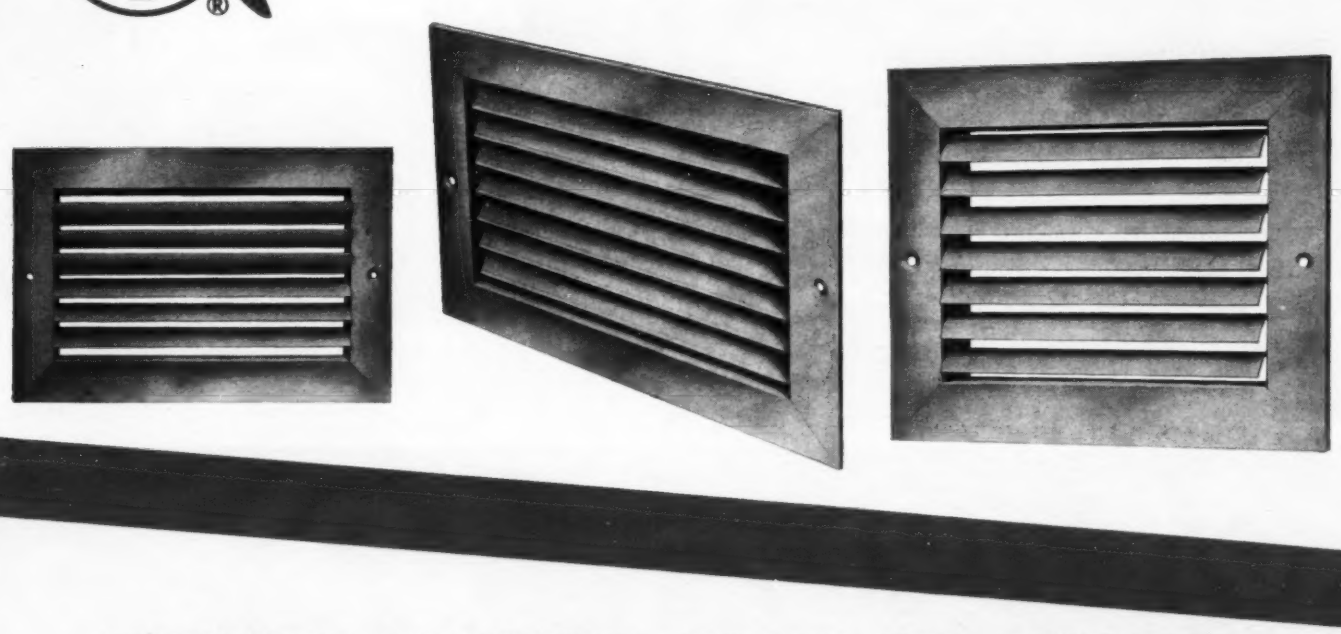
Install new pulley combination, motor and belt, and start up unit. Motor pulley should be adjusted for cooling rpm calculated above.

Now measure system total external static pressure by placing probes of slope gauge in ductwork at return air boot and also in warm air plenum. This gives total resistance to airflow, measured in inches of water.

To simulate the added resistance of the coil, follow this procedure. Look up the static pressure drop for the coil to be used in the manufacturer's specifications at the cfm required. Let us say this value is 0.20 in. of water at the rated air volume we are concerned with. Apply a factor of 0.45 to the rated pressure drop of the coil. In this case, .45 × .20 = .09 in. of water. Close the supply balancing dampers (after first marking their position) until slope gauge reads .09 in. higher than previous reading.

Next, again determine the cfm by the formula based on temperature rise across unit. Also read the motor amperage under these conditions and compare to name plate current.

(To Be Continued)



STANDARDLINE

. . . EXTRUDED ALUMINUM GRILLES AND REGISTERS

STRONG — Tuttle & Bailey STANDARDLINE grilles and registers have *all* parts of extruded aluminum . . . far stronger than rolled aluminum and impervious to rusting, pitting, corrosion . . . even in salt air. You can count on STANDARDLINE units to retain a "just-installed" appearance.

EASILY COLOR-MATED — STANDARDLINE surfaces are etched to a rich lustre and coated a clear acrylic lacquer. The fine finish is handsome as is, or serves as an efficient base for color-matching grilles and registers to any decor without fear of "bleed-through" or need for a prime coating.

FOR EVERY INSTALLATION — T&B offers a *complete line* of grilles and registers designed to fill the bill for every job . . . commercial or residential . . . and in any climate.

For more information, call your nearest T&B Representative or write us direct.

TUTTLE & BAILEY

Division of Allied Thermal Corporation
New Britain, Connecticut
Tuttle & Bailey Pacific, Inc., City of Industry, Calif.

McQuay Appoints L. Churchill Austin

MINNEAPOLIS—L. Churchill Austin has been appointed sales manager of the refrigeration and wholesale air conditioning division of McQuay, Inc., it was announced by G. G. Workinger, general sales manager.

L. C. Austin

Prior to joining McQuay, Austin was sales manager, advertising director, and secretary of Norris Dispensers, Inc., manufacturer of milk dispensing equipment.

After receiving his B.A. degree from Ohio Wesleyan university, Austin attended Northwestern university law school and the advanced management program of the Harvard graduate school of business administration.

Cleaver-Brooks Joins National BHC

NEW YORK CITY—Cleaver-Brooks Co. has become a member of the national Better Heating-Cooling Council, it was announced by Franklin Greene, executive director and secretary.

The Milwaukee based manufacturer of package firetube boilers, will be a member of BHC's Commercial & Industrial Div.

Air-Cooled Condensing

The Story of Its Evolution Told by a Pioneer

This is a story of the evolution of a technology—air-cooled condensing, by a man who was a pioneer in the field. There is historical and commercial interest, to be sure. Equally important, here is an example of the truism that "Problems are not obstacles; they are stepping stones to progress." As new problems arose in dry condensing, new techniques and devices were developed to cope with them. As a result, people who only a few years ago relegated air-cooled condensing to "units under 10 hp" are now specifying air-cooled equipment, where applicable, in systems calling for hundreds of tons of cooling.

TRENTON, N. J. — "No one can seriously question that air-cooled condensing and the developments to which it has led have made it possible to penetrate refrigeration and air conditioning markets which it would have been impossible to penetrate otherwise. Progress from the industry's first attempts to use remote air-cooled condensing to today's use of highly instrumented, packaged, year-round outdoor compressor units has been rapid and continuous."

Speaking is Israel Kramer, president of Kramer Trenton Co., a pioneer in air-cooled condensing who recalls the reluctance of the cooling industry to believe that the technique could ever be applied to other than unique installations, and small ones at that.

Ice Cream Merchandising Was Seasonal

"I recall the time when ice cream merchandising was seasonal," Kramer said in reviewing the history of air-cooled condensing for the NEWS. Ice cream manufacturers used to supply the freezers for the season, then take them back and store them until the next season; in the meantime, they would clean and recondition the units.

"One of these ice cream manufacturers had trouble with its ice cream chests cutting out on high head pressure and causing the softening of the ice cream on hot days. We were called in for help. We had one of these units brought to our shop and we played around with it for many weeks without lowering its head pressure.

'Remoting' the Condenser

"We came up with the idea of removing the condenser from right behind the compressor motor, which also carried the condenser fan on its shaft, and by 'remoting' it we were able to now enlarge the condenser and also supply its own motor and fan. It worked. This was the beginning of the 'unit condenser,' which we rechristened to 'Unicon' for the models which we made.

"Naturally, we began building larger and larger remote condensers and, until after the second World War, we were the only coil manufacturer in the U.S.A. which regularly listed in its literature for over a decade a complete selection of remote type air-cooled condensers up to about 15 tons' capacity.

"This enabled the refrigerating industry to gradually make use of these units in areas where conditions demanded the elimination of wet condensing, such as areas where there was water shortage, excessive water hardness or corrosiveness. In that way the industry, and we, gradually accumulated a very substantial log of experiences with remote dry condenser installations, many of them in semi-tropical areas, which functioned perfectly because they were deliberately engineered for the climatic conditions in which the particular installation was made.

"A confirmed user of air-cooled equipment, a food chain, quips, 'The industry now talks about *oversizing* the air-cooled condensers; the point is that they are now the right size; historically, for a number of reasons, they were undersized.'

"As installations of remote air-cooled condensers grew in number and size, and moved closer and closer to semi-tropical areas, we lived in constant fear whenever newspapers reported of 'hot spells' in Texas or Florida. The strange thing, however, was that we never experienced a complaint of inadequacy during summer operation. What floored us was that we soon began to hear of serious difficulties with dry condensers during winter operation, particularly during 'cold spells' rather than during 'hot spells.'

"We were faced with the realization that some of these units were expected to operate all year. With the remote condenser mounted outdoors—on a roof or in an alley or on a canopy — there were occasions when the temperature of the condenser was lower than that in the fixture or area being cooled by the evaporator.

"During the off-cycle, therefore, the refrigerant would tend to migrate to the condenser, causing serious starting difficulties using pressurestat. Also due to the extremely sharp drop of pressure in the liquid receiver during winter we frequently encountered inadequate feeding of the expansion valve to the evaporator.

"About this time (1945) our 'Thermobank' made its debut. The chief feature of the Thermobank system was not only that it

The Logical Condenser Change-Over for Model "K" Compressors

MIDGET UNICON, center, replaces old bare tubes on a model K compressor, left, in early application, to result in more efficient system shown at right.

C1534 FLEETSIDE PICKUP ▲

R1254 RAMPSIDE PICKUP ▲

C1405 7½-FT. PANEL ▼

C1504 STEPSIDE PICKUP ▲

R1205 CORVAN ▼

was completely automatic but, that the defrost period, due to the 'Heat Bank,' was so brief that it barely affected the freezer temperature.

"To achieve this fast defrost the condensing temperature — the head pressure — had to be normal; but with the use of the remote outdoor condensers the head pressure dropped sharply and the defrost became uncertain during cold spells. Something had to be done about head pressures with remote outdoor condensers operating in winter weather.

"Our engineering department, after many trials and errors, came up with a family of inventions which we dubbed 'Winterstats.' These Winterstats provided controlled flooding of the condenser with refrigerant liquid during cold outdoors so as to vary in infinite steps the heat dissipating capacity of the condenser and thereby maintain (a) a constant head pressure, as well as (b) a constant liquid receiver pressure.

Air-Cooled Condensing Moved Into Field Of Air Conditioning

"While the use of air-cooled condensing was originally designed almost exclusively for refrigeration applications, the increasing use of year-round air conditioning in interiors of large buildings, in electronic equipment rooms, and many other industrial applications, now calls for optimum operation of air conditioning equipment no matter what the outdoor ambient.

"It gradually became apparent to us, that it would be logical for us—who were offering the remote air-cooled condenser, the defrost system, the low ambient control in a disintegrated, field-fabricated manner—to now combine our components in a package of our own design. Our salesmen had repeatedly told us that they always had to make recommendations of the proper compressor with our units, anyway."

"Current result of this thinking is Kramer Trenton's 'Outdoor Compressor.' In one pre-wired package there can be fully instrumented dry condensing, low ambient control, defrost control, and an enclosure for year round outdoor use, factory tested and factory run-in.

"The air-cooled condenser plus Winterstat-type controls, for all practical purposes, have historically liberated the refrigeration cycle from water as well as any climatic limitations; and by further developments made possible the elimination of the use of precious floor space to house refrigerating machinery.

"It is important to remember that such units as the outdoor compressors are not strictly for roof-top applications; they are just what their name implies—units for mounting outdoors and units which will operate all year, winter and summer. Such units now available in sizes up to 70 tons for air conditioning are a logical evolvement of air-cooled condensing developments over the years.

Sherer-Gillett Meeting Set for Oct. 4 to 7

MARSHALL, Mich. — The yearly meeting of zone sales managers of Sherer-Gillett Co. will be held again at the home office, with the field men converging on Marshall during Wednesday, Oct. 4.

A two-day program will bring them up-to-date on company products and policies and an evaluation will be made of contemplated new products and merchandising methods.

Saturday, Oct. 7, will be a "free-from-business-day," highlighted by attendance at the Michigan State - Stanford football game at East Lansing.

August Cooling Sales Up In Three Areas

DETROIT — First reports received by the NEWS on local-area sales of air conditioners in August show gains over August, 1960, in all three reporting areas —St. Louis, St. Petersburg, Fla., and Cleveland.

In the territory served by Union Electric Co., St. Louis, August air conditioner shipments by 11 distributors soared to 2,169 from 792 a year earlier, a gain of 173.9%. For the first eight months of 1961, shipments were up 39%, totaling 15,552 compared to 11,188 last year.

August sales of heat pumps and air conditioners in the territory of Florida Power Corp., St. Petersburg, rose to 3,387 units from 3,287 in August, 1960, an increase of 12.2%. For the January-August period, sales totaled 15,142, up 14% compared to the 13,285 units sold in the corresponding period of last year.

Florida Power indicated that tonnage added in August totaled 6,773, 7% better than the previous August. Of this total, heat pumps accounted for 1,878 tons and cooling only, 4,895 tons.

According to the Electrical League of Cleveland, shipments of room air conditioners in Cuyahoga County reported by league member distributors for August totaled 632, up 30% from the 487 total for August, 1960. Shipments for the first eight months of the year, however, were down 5%, the totals being 5,761 for the 1961 period and 6,072 for the 1960 period.

Shipments of central residential systems by the Cleveland-area distributors were down both for August and the first eight months.

Philco Head Sees Ford Interested In All Its Lines

PHILADELPHIA — Ford Motor Co. "will be interested in preserving and enhancing all phases of Philco businesses," including consumer products, in the opinion of James M. Skinner, Jr., president of Philco Corp.

Skinner disclosed this opinion in a statement made to Philco distributors, associate distributors, and the Philco field force. The statement said the proposed acquisition of Philco assets by Ford Motor included all of Philco's assets, plants, skills, and businesses.

Philco's Consumer Products Div. "represents a large percentage of our assets and our total current business," Skinner stated. "Further, the Consumer Products activities of Philco represent an important segment of a 3 billion dollar consumer appliance market."

Philco plans now "and if in the future, we become a wholly-owned subsidiary of Ford," to continue to create a line of consumer products, and to support this merchandise with sound pricing, merchandising, and advertising, the statement concluded.

FROM CHEVROLET'S NEW WORLD OF WORTH!

JOB-MATCHED CHEVROLET TRUCKS FOR '62

NEW POWER! NEW EYE APPEAL! CHEVIES FOR EVERY CHORE

From Chevrolet's broader-than-ever 1962 lineup of trucks for every kind of hauling job comes a full roster of better-than-ever light-duty models, specialists at trimming tough jobs down to size in short order. Here are new models and new power choices to meet a wider range of working needs, plus a trim new look for all conventional models that gives you safer seeing down the road! Now it's easier than ever to get Chevrolet's traditional thrift and dependability going for you, in the model tailor-made for your kind of job. There are work-loving pickups in a full range of sizes and weight ratings, in sleek Fleetside and handy Stepside styles, plus sensational Corvair 95 Rampside and Loadside models built to outwork anything in their class. In addition, there's the biggest choice ever of *choice* delivery models, including smart, fleet-stepping panels, high-capacity Step-Vans for every job up to 10,000 lbs. GVW, and the wonder-working Corvair 95 Corvan. For specialized requirements there are sturdy stake models and chassis-cabs in every size and weight class, rounding out a selection sure to include a better way to do *your* job! Why not see your nearby Chevrolet dealer for full details on the model made for you, and start finding out right away how much better business can be. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

NEW EASY-VIEW STYLING—For 1962, all conventional pickups, panels and Suburban Carryall models ride in with trim new look-ahead lines, featuring a new hood design sloping lower at the front to let you see the ground as much as 8½ feet closer. Safer, easier viewing results! Also, there's a handsome new grille, new custom exterior trim, and sparkling new colors. Inside, too, things are looking better for the man at the wheel, with new easy-to-live-with colors and tough good-looking upholstery.

NEW STEP-VAN 7—Here's good news—211 cubic feet of it! —for light-duty delivery operators with high-bulk lading problems. And Chevrolet's new Step-Van 7 is built to give your bulky loads a better ride, too, on the years-ahead Independent Front Suspension chassis design that's revolutionized the conventional truck field. With the big-saving High Torque 235 Six under the engine box, there's plenty of power to take your tightest schedules in stride, and a long list of better built body features adds up to easy work and extra-long working life.

NEW HIGH TORQUE POWER—New wider power choice for '62 lets you match your job needs better than ever, in all conventional pickup, panel and Carryall models. There's the standard-equipment 235 Six, cornerstone of the Chevrolet reputation for unbeatable operating economy, and the spirited, ultra-efficient 283 V8 for premium payload punch. *And now, in addition, the heavy-duty 261 Six is available at nominal extra cost, offering an extra measure of stamina and durability to keep on delivering in the roughest, toughest kind of duty.*

JOB-TESTED CORVAIR 95's—They've got a year of enthusiastic acceptance behind them and they're still the talk of light-duty trucking! Chevrolet's sensational Corvair 95 models, in two pickup styles and the spacious Corvan, have set new standards for space and weight utilization in the half-ton field. With a roomy driver compartment up forward and the compact, perky 145 Six tucked under the load floor at the rear, the space between goes to work in a way conventional designs can't match. And, to top it off, this new way to work comes in as pretty a package as ever came down the pike!

YOURS FOR THE ASKING . . . FREE INFORMATION

Use this convenient ordering coupon to get descriptive literature and specifications on new 1962 Chevrolet trucks to match your job. Just check what you would like, fill in your business address and mail to: Chevrolet Motor Division, P.O. Box 7271, Detroit 2, Michigan.

Please send:
1. Full-Line Brochure..... ☐
2. Corvair 95 Models..... ☐
3. Pickups & Light-Duty.. ☐
5. Suburban Carryalls.... ☐
6. 4-Wheel-Drive Models.. ☐
7. Medium- & Heavy-Duty Models..... ☐
8. Diesel-Powered Models. ☐
9. Tandem Axle Models... ☐

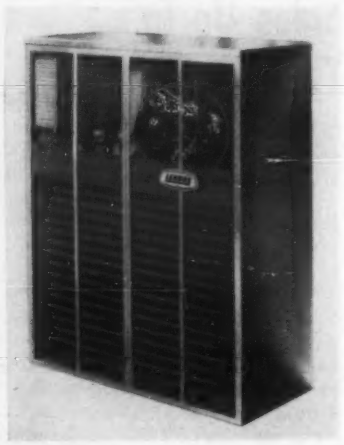
1

Name
Title
Company
Address
City Zone
County State

1962 CHEVROLET JOBMASTER TRUCKS

CHEVROLET

$2,045,000 Lennox Contract--



NEW LENNOX thin-style condensing unit is feature of company's "QC" heating-cooling builder package for small homes. Air is drawn over face of condensing coil, which represents two-thirds of the area, and out the same side. Refrigerant lines can enter from top or rear.

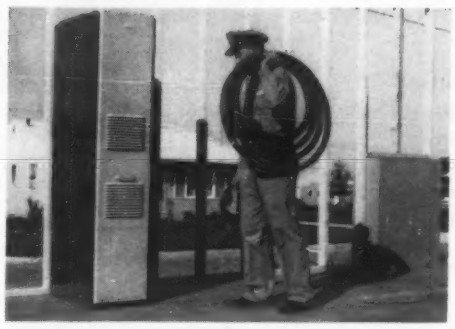
(Continued from Page 1)

The purchase agreement, described as one of the largest of its kind ever made in Fort Worth, was announced at a luncheon meeting of the principals in the Fort Worth Club.

Heating capacities will run from 51,000 to 80,000 Btuh. Accompanying cooling will be 1½ and 2 tons.

John Norris, president of Lennox, flew from the company's general office in Marshalltown, Iowa, to meet with C. P. Hadley, president, and M. B. Fleet, vice president of the lumber firm.

Others at the meeting included Dave Ritz, sales manager for Sabine; Jack Melcher, general manager of Lennox Southwestern division in Fort Worth; Don Belknap, assistant sales manager for Lennox; James Lee, sales representative for Lennox, and A. B. Holder, Lennox dealer who will make the installations of equipment as air conditioned homes are sold in the new addition.



MECHANIC SHOWS how he would rough-in and install the "QC" package. Condensing unit is installed in studding at right. Pre-charged refrigerant lines with quick couplers are run through studding or joist space to integral cooling coil in special furnace. Furnace may be located where desired.

PARTICIPANTS in $2,045,000 contract between Lennox Industries, Inc. and Sabine Valley Lumber Co., Fort Worth, Texas are (shaking hands, l. to r.) John W. Norris, Lennox president and C. P. Hadley, Sabine president. Others (l. to r.) are M. B. Fleet, Sabine vice president; Jack Melcher, Lennox Southwestern division general manager; and A. B. Holder, Holder Air Conditioning Co., installing contractor.

Norris told the group at the luncheon meeting that residential air conditioning is making greater advances in the Southwest than in most of the northern states. He said a survey was made, showing approximately half the new homes being built in Fort Worth are equipped with central air conditioning.

Air conditioning has come to the low-priced homes, it was stated. Hadley said he anticipates that a majority of the new houses in Rancho North will be equipped for air conditioning. Price range of the homes is said to be from $8,250 to $13,000.

Norris said his firm has increased production of air conditioning this year by 21% more than the similar period of last year. He said the increase in production for the industry as a whole over the nation is 5%.

Mueller Climatrol--

(Continued from Page 1)

sentative, Milwaukee city sales manager, sales promotion manager and, since 1959, as general sales manager.

As manager of marketing, Schmidt will be responsible for all internal and external sales functions, as well as all advertising, promotion, and publicity activities. He will report directly to H. P. Mueller, Jr.

Hase joined Mueller Climatrol in 1948 and has served as a sales representative, sales engineer, manager of sales engineering and, most recently, as manager of planning. He will now be responsible for all external sales functions for the nationwide operation. Hase will report to Schmidt.

Richard Houghton Dies

DENVER — Richard (Dick) Houghton, who had been with McCombs Supply Co. for more than 15 years, died recently.

Carrier Room Units Go Like '60

SYRACUSE, N. Y. — Carrier Air Conditioning Co. reported retail sales of its room air conditioners during 1961 are even with the comparable period last year.

Joseph S. Dougherty, product manager for room units, attributed the successful selling effort to sustained late summer hot weather in many parts of the country and to two special promotional campaigns.

"Our carry-over of room units to the 1962 selling season is below that of last year, and is almost entirely in the hands of Carrier and its distributors instead of dealers," said Dougherty.

Dougherty concluded that dealers are in excellent position to order and buy 1962 units and the hot, late summer should have put the public in a receptive mood for early season promotions next spring.

Plant B.O. bother your neighbors?

Nothing will rouse the neighbors faster than plant odors.

If your present processes dump an odor problem onto your neighbors you may be building a public relations crisis—and you may also be throwing away valuable and recoverable solvents.

Activated carbon is a nearly universal adsorbent of odors and vapor contaminants. With activated carbon in your exhaust air system you can recover and re-use valuable solvents now being blown away. You can also recirculate the purified air and save substantially on plant heating or cooling costs. It's a good way to make your neighbors happy, too.

Give us the details of your application and we will supply specific data and samples—or write for Literature Group T-380.

Barnebey-Cheney, Columbus 19, Ohio

activated charcoal air purification

Barnebey Cheney

Hermetic Medic . . . No Johnny Come Lately

Awards, degrees, citations by the dozens have been showered on Dr. Medic, recognized leader in the field of Compressor-ology. Patients in all degrees of ill-health have found his hands quickly relieve chronic disorders.

hermetics inc. 6122 N. 21st ST., PHILA. 38, PA.

REBUILDERS • All type refrigeration & air conditioning compressors • 48 hr. Service

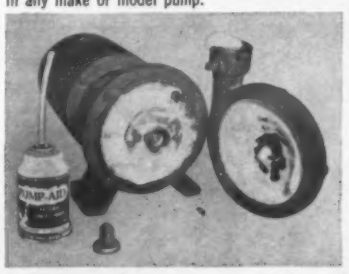
PREVENT STUCK PUMPS!

GET USE PROVEN PUMP AID

with New, Improved Features.

1. A new RUST INHIBITOR . . . which VAPORIZES and reaches into the smallest crevices.
2. CONTROLLED FOAM ACTION . . . provides full seasonal protection without foam at start up time.

Now is the time to prevent stuck pumps . . . eliminate consuming repairs next spring. After draining pump, simply inject PUMP AID into pump housing through drain hole. Aerosol packaged PUMP AID E-X-P-A-N-D-S to cover all interior surfaces. At start-up time — just throw the switch and your pump is running. PUMP AID is water soluble and washes away. May be used in any make or model pump.

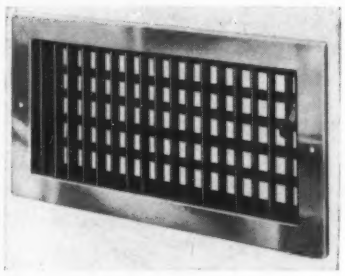


PUMP AID... PREVENTS CORROSION • PRESERVES SEALS • WILL NOT FREEZE • WILL NOT EVAPORATE • IS WATER SOLUBLE • IS NOT TOXIC • IS EASY TO USE • IS REASONABLY PRICED

Order by the case of twelve cans today from your dealer and be prepared when shut-down time comes.

Or write . . .

THE GARMAN CO.
1253 GROVER RD.
ST. LOUIS 25, MO.



Commercial Register Line Introduced

● A new line of commercial registers featuring individually-pivoted vertical face bars and a horizontal multi-louver valve has been introduced by Air Control Products, Inc., Dept. AH&RN, Coopersville, Mich. Identified as the No. 270 Series, the line was designed for use in those commercial applications where an opposed-action valve is not required.

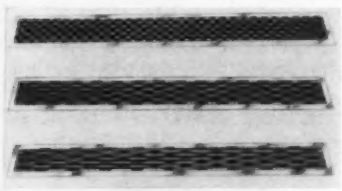
Finished in beige baked enamel, the new register matches the company's "Multi-Trol" line of commercial registers and grilles in appearance, making it possible to use No. 270 registers and Multi-Trol registers and grilles on the same job, the company pointed out.

Cleaning Solvent Offers Lower Toxicity

● "V-Sol," a new industrial cleaning solvent, said to have up to 20 times less toxicity than carbon tetrachloride, is announced by Speco, Inc., Dept. AH&RN, 7308 Associate Ave., Cleveland 9, Ohio.

The manufacturer advises that it is non-flammable and can be used with safety for all applications, including confined areas.

V-Sol is recommended for removing oil, grease, wax, and tars from hand tools, sheet metal, machine tools and components, tubing, and other metal products. It is suitable for dip cleaning, cold cleaning, and bucket cleaning, according to the company. For dip cleaning, V-Sol is furnished in a 5-gal. container with a tray that can be raised or lowered.



'Staccato' Diffusers Have Unusual Appearance

● A new line of extruded aluminum linear air diffusers called the "Staccato Line" has been announced by Titus Manufacturing Corp., Dept. AH&RN, Waterloo, Iowa.

The line, according to the company, "introduces an exclusive new dimension to the linear concept of continuous line diffusers. This new dimension is primarily achieved in the copyrighted design of the Staccato Line louvers.

"To get the 'staccato' effect, the louvers of the new diffusers have been recessed at regular intervals with the intervals being varied according to design desired. This has made it possible to highlight a series of short-spaced 'dashes' along each louver that stand out in relief against a dark background. The face of the raised sections on each louver are in brushed satin aluminum finish and present a contrast to the anodized black finish of the rest of the louver."

The diffusers "provide excellent air duffusion for heating, cooling, and ventilating, and can be used in the sidewall or ceiling," it was stated.

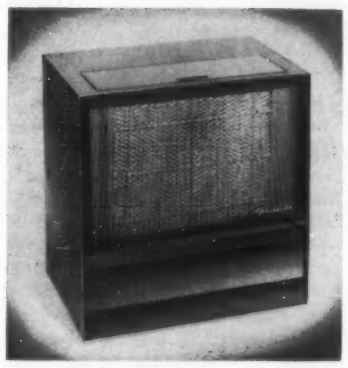
Refine Design of Portable Humidifier

● A design refinement in its portable humidifier, model 136, so that it performs as a high capacity air cleaner during the summer months, has been announced by the manufacturer, Research Products Corp., Dept. AH&RN, Madison 1, Wis.

"The combination unit operates during the winter heating season as a high capacity (12 gals. of water per day) humidifier, and is equipped with an 'EZ Kleen' washable pre-filter for air cleaning," it was explained. "Humidification is by evaporation from a 2 in. water panel.

"During the summer, the water panel is easily replaced by a 2 in. EZ Kleen filter; the water pump

NEWS readers are invited to write to the editor giving their opinions on any subject of interest to the industry.



is switched off—and the unit operates as an air cleaner only. The air is cleaned by two filters — both coated with 'Super Filter Coat' adhesive — so that an unusually high percentage of dust, dirt, pollen is trapped.

"A 10 in. fan handles the air movement. Capacity of the unit is 200 cfm—air in a 12 ft by 12 ft room is completely recirculated and double filtered every five minutes."

'Mesh Fan' Features Simplicity, Economy

● Development of a new type of fan called the "Mesh Fan" has been announced by Heat Pump & Refrigeration, Ltd., Dept. AH&RN, Lansdowne Lane, Charlton Village, London, S.E.7, England.

"The construction of the Mesh Fan is extremely simple, and among its many features are compactness, low price, quiet operation, and high efficiency."

"The Mesh Fan incorporates an impeller which is formed in mesh such as 'expanded metal,' plastic, or other material. The mesh has the usual characteristic pattern of diamond or similarly shaped openings and the narrow strands, which during the stretching operation in manufacture receive small inclination to its plane, form hundreds of small scooping blades. The mesh, when formed into a cylinder provides a rigid yet light centrifugal type impeller.

"To complete a Mesh Fan the runner is provided with an end plate or diaphragm and fitted on to the motor shaft. The whole assembly is then fitted into a scroll-shaped housing which will collect and direct the air as required.

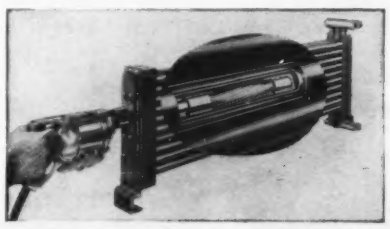
"When the impeller rotates the air which is thrown off radially by the centrifugal force is then collected in the scroll and scooped out by the small blades. The purpose of the scroll is to convert the high velocity pressure at the blade tips into a static pressure.

Full production of fans with outputs ranging from 25-200 cfm will begin early next year. However, a 4 in.-diameter fan with output of 70 cfm will be available soon.

"Here's why I always pick H & M water-cooled condensers

...you can clean them safely because you clean them mechanically!

"Time was when I used chemicals to clean out the scale and sludge in my water-cooled refrigeration systems. But soon I found out that the chemicals were doing damage not only to the condensers but the cooling tower and pump, too.



"Now I always buy Halstead & Mitchell Water-Cooled Condensers, because they can be cleaned safely with a simple mechanical tool and an ordinary electric drill. The end plates remove easily to expose the water tubes."

Another good reason to choose H & M condensers: they give more liquid sub-cooling because of the double-tube design and true counterflow of refrigerant and water.

There are five different types, including models for sea water or poor water conditions, in capacities of ⅓ to 25 tons.

Call your parts wholesaler for more information, or write for Bulletin WC-300. Halstead & Mitchell Co., Dept. 101 Bessemer Building, Pittsburgh 22, Pa.

Water-Cooled Condensers • Air Handlers and Coils • Cooling Towers • Air-Cooled Condensers

Export Representatives: Sabal-Kielmann, Inc., 15 William St., New York 5, N. Y.

Direct Drive Blower Systems

Formerly Considered the 'Cheap Way' of Doing the Job, It Is Now Coming Into Its Own as Design Quality Is Emphasized

By the Engineering Department, Central Air Conditioner Section, General Electric Co.

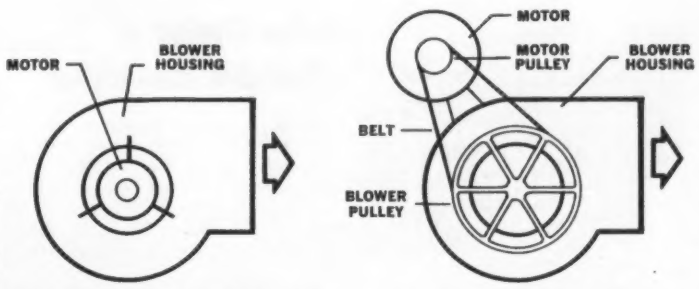
It's hard enough to sell in today's market without having to overcome a legend in the process. The legend is an ugly, generalized image which still persists in the minds of some customers and equipment specifiers about direct drive blowers in heating and cooling equipment. Probably no other phase of heating and air conditioning design has been so beclouded by confusion, uncertainty, misinformation, and malpractice.

"Direct Drive" is still a synonym for "cheap" in the minds of some customers. This cannot be denied. The legend grew from a foundation of near fact many years ago. It persists today because the industry itself has failed to point out the many performance advantages which are unique to direct drive in many applications. We have failed to spread the truth, as it *now* exists, about quality design in direct drive units.

Many manufacturers have, indeed, designed direct drive equipment of true quality throughout. But their sales efforts have too often been hindered or completely frustrated by the tide of adverse opinion on the subject. It should be re-emphasized that this is not the customer's fault, but the industry's.

Why did "direct drive" acquire a bad reputation in the first place? The debut of direct drive "en masse" several years ago was, to put it bluntly, one of which the industry cannot be proud. When direct drive first saturated the market place, high quality was the exception, not the rule.

Direct drive units were generally designed, produced, sold, and installed strictly on the basis of price. The units simply reflected this thinking throughout their design. Belt drive was reserved for the higher quality equipment in a manufacturer's line. If a unit had belt drive, other aspects of its performance and construction generally confirmed to the over-all high quality level which customers had come to associate with belt drive equipment.



BASIC MECHANICAL DIFFERENCES between direct drive and belt drive blower systems is shown above. The direct drive transmits power directly from motor to the blower wheel. The belt drive transmits the power through the motor pulley, through the belt, then to the blower-wheel pulley.

Units with direct drive were designed with low cost as the primary criteria. Correspondingly, the remaining aspects of performance and construction suffered. Engineering margins were trimmed to the minimum, or worse. Motors were the cheapest available; blowers the smallest possible.

With inadequate design margins, the inevitable production and installation variations brought equally inevitable customer dissatisfaction. Those advantages which can be unique to direct drive never had a chance.

This was further aggravated because the over-all unit design had nothing to offer except low price. Flimsy, tinny cabinets acted as echo chambers for all internal noises, and were notorious for "oil canning" on start-up and shut-down. Inflexible air flow adjustment led to excessive compromise at the job site in matching the unit performance with the duct system air flow versus static characteristics.

Cheap, troublesome controls and accessories heaped even more misery on the entire situation. It was only human that specifying agents tended to condemn direct drive, per se, because of the company it kept. However, a cheaply designed belt drive would, in similar company, create even more havoc in most respects.

Current equipment available on the market today justifies and necessitates a re-examination of all the arguments on the subject.

The discussion is necessarily confined to General Electric direct drive and belt drive equipment. This, because a company can speak with complete authority only on the features and engineering characteristics of its

WAGNER® MOTORS AT WORK

power to ventilate an air terminal

Quiet Wagner® polyphase motors drive air moving equipment at St. Louis' jet age airport

Keeping any building warm in winter and cool in summer is a demanding job. It's a demanding, king-size job in the 50,000 square foot Municipal Airport terminal in St. Louis.

Air movement in this architecturally renowned building is handled by five air supply fans and five air return fans. They're all driven quietly and dependably by Wagner* Type RP motors . . . five 40 hp motors for the air supply fans, and five 15 hp motors for the air return fans.

These open type polyphase squirrel-cage motors have the stamina to be perfect drives for fans, pumps, blowers and compressors. They operate for long periods without maintenance . . . efficiently produce power even under critical conditions. Compact and dripproof, they get the job done at St. Louis' jet age airport and in millions of other applications across the country. They can do a job for you. Your Wagner Sales Engineer will be glad to show you how. Call him. Soon.

Wagner Electric Corporation
6441 Plymouth Ave., St. Louis 33, Missouri
Branches and Distributors in all Principal Cities

Two of the five air return fans in the St. Louis airport terminal building. All five are powered by 15 hp Wagner Type RP motors.

WM61-6

PLAN TO BE THERE!

ATTEND EXHIBIT

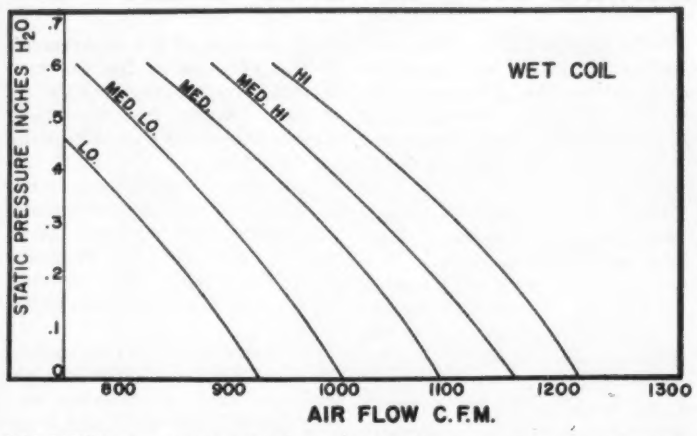
12TH NATIONAL EXPOSITION AIR-CONDITIONING, HEATING & REFRIGERATION INDUSTRY

LOS ANGELES

FEBRUARY 12-15, 1962

For exhibit space, contact: **Geo. E. Mills, Show Director,** 1346 Connecticut Ave., N.W. Washington, D.C. • Phone COlumbia 5-0405

Figure 1



FAN CURVES of a typical 5-speed direct-drive blower used on a 2½-ton capacity air handler.

own systems. Although some of the General Electric features are exclusive at this writing, quality direct drive units are no longer a monopoly, and several leading manufacturers were responsible for putting a "best foot forward" in this vital pursuit.

One of the basic arguments still advanced against direct drive is based on its unsavory infancy . . . namely, that lower cost necessarily entails lower quality. It is a fact that direct drive saves the cost of belt, pulleys, and bearings. But it is also a fact that a direct drive system, composed of quality components, and properly engineered, has inherently greater potential for reliability, longer life, and fewer service calls.

Other things being equal, simplification and reliability go hand in hand. Some of the most common service considerations in belt drive equipment deal with belt replacement and bearing wear from improper belt adjustment. In addition, direct drive *does not* require the use of high starting torque motors. Replacement of electrolytic capacitors and centrifugal cut-out switches is therefore not a factor in direct drive systems and lubrication is not a seasonal bother, since good direct drive systems employ a 25,000-hour oil reserve.

There are no belts or pulleys to contribute to starting noise. A glance at a belt driven ventilating fan versus a direct driven fan will help visualize this. All belts lose something when they transmit power. The sequence of a belt drive is for the motor to start first, with some initial slip. The belt then moves, and with some additional slip transmits motion to the blower pulley. It is something like a freight train starting up. The engine pulls against the first car, which in turn pulls against the second car, and so on down to the end of the train. Each makes a distinct noise as the system accelerates. Since direct drive is a unitized design, the motor and blower start smoothly and simultaneously.

Can direct drive run quietly? An unqualified "Yes!" The answer to noise in direct drive systems lies only in proper conception of the entire unit design. Again, neither belt drive *nor* direct drive will run quietly if the rest of the unit isn't up to it.

Integrity of construction and cabinet insulation are elementary requirements regardless of the drive used. Additional factors, of course, play a part in the design of a high caliber direct drive. The blower size must be large enough to keep noise in the quiet range.

It is a characteristic of direct drive systems that the blower tends to unload and revolve faster when the filter becomes excessively dirty. This is a distinct advantage in properly designed equipment. If the blower wheel is large enough, there is sufficient margin so speed pickup does not become excessive under such conditions. At the same time, this increased speed tends to keep the air flow near the system design point. This is not characteristic of belt drive systems, since they are essentially constant speed drives.

Direct drive, then, tends to maintain over-all unit performance at the design level, and is especially important in the smaller residential applications. Erratic filter attention is a common trait among average homeowners. Thus, good direct drive systems do a lot to protect the consumer himself.

General Electric direct drive systems have very steep motor-blower characteristics. (See Fig. 1). The equipment can therefore be installed in structures with high resistance duct layouts with inconsequential loss of air flow. The latest G-E direct drive units employ a five-speed motor . . . more than sufficient to allow the installer to tailor the air flow to the job. The speed selection is easily accomplished through the selection of the proper tap on a terminal board. This has eliminated one of the most vehement objections formerly raised against direct drive.

Air conditioning applications in warm air furnace systems also benefit from automatic speed

(Continued on next page)

Another AIRSERCO TIME SAVER and MONEY MAKER!

— the all new AIRSERCO No. 8815 POTENTIAL & CURRENT TYPE

RELAY TESTER

A vital new product developed for the Cooling Service Engineer

makes testing relays as simple as A-B-C!

THESE UNUSUAL, ON-THE-JOB FEATURES:

- A positive operating test for potential and current type relays, working on 115, 208, or 230 volts, a.c.
- Determines unknown relay voltage.
- Clear, concise operating instructions etched on face of panel.
- Doubles as continuity and leakage indicator.
- Compact, tool-box size for easy portability.

SPECIFICATIONS

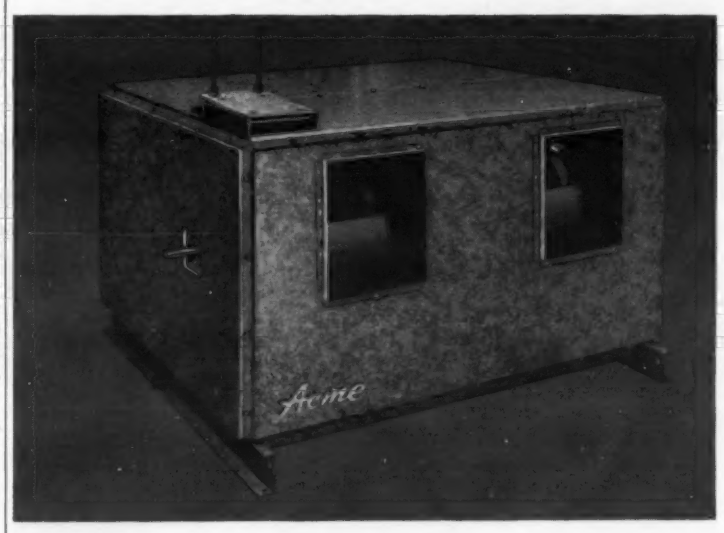
Full range voltage selection: 115, 208, or 230 volts, a.c. • Voltage selector with center-off position. • 3-wire, color-coded test leads with insulated clips. • 7½ ft line cord. • All metal cabinet with strap handle and cord pocket. • Size: 8½"H x 4½"W x 3"D. • Weighs only 3 pounds. • Educational manual included.

BUY FROM YOUR AIRSERCO WHOLESALER

AIRSERCO MFG. COMPANY
THE AIRSERCO BUILDING
3875 Bigelow Blvd. • Pgh. 13, Pa.

Acme Announces

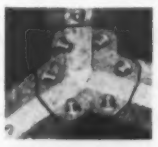
A NEW AIR HANDLER LINE



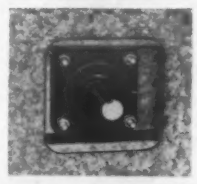
engineered to your specifications

After years of intensive laboratory and field research and development work, Acme is proud to announce *a new advanced-design line of air handlers* for heating, ventilating and cooling applications . . . a line that features a host of engineering and construction refinements most wanted by architects, consulting engineers, contractors and building owners nationwide.

Installation flexibility, for example . . . to meet virtually any requirement you may have . . . is provided in several ways. From two to four coil sizes, in either right or left-hand combinations, are available in each casing size . . . six motor positions and four fan positions are offered . . . and on multi-zone units, mixing and filter boxes may be arranged vertically or horizontally.



All sections are made from rolled sheet steel, angle irons are eliminated, corner post construction offers greater strength and rigidity. Panels, built on specific centers, are securely fastened with self-tapping, hexagon head screws to prevent air leakage, facilitate panel removal when necessary.



Only external, sealed self-aligning "Sealtite" ball bearings with "Alemite" fittings are used to simplify service and maintenance. Fan mount shafts are hollow, designed and sized to minimize shaft deflection, increase bearing life.

There's more, much more . . . including the fact that the line includes 37 different horizontal, vertical and multi-zone type units, 14 sizes, capacities to 44,000 cfm. An Acme Air Handler for every application. For complete details, fill out coupon below and mail it today.

Acme INDUSTRIES, INC.

JACKSON, MICHIGAN • GREENVILLE, ALABAMA

MANUFACTURERS OF QUALITY AIR CONDITIONING AND REFRIGERATION EQUIPMENT SINCE 1919

ACME INDUSTRIES, INC.
JACKSON, MICHIGAN

GENTLEMEN: Please send, immediately, literature on your new Air Handler line.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

Direct Drive Blowers--

(Continued from preceding page)
changeover, which is simple and economical with five speed direct drive equipment. Cooling air flows are usually much higher than those employed in heating. In belt drive systems, pulley readjustment is commonly necessary when the seasons change. In direct drive, it's a simple automatic function of the thermostat.

Not a Panacea

Are direct drive blowers a panacea for all applications? Obviously not. General Electric employs direct drive systems only in those equipment sizes which can best utilize its features and advantages . . . primarily residential and small commercial applications of three tons cooling capacity and below. It is employed in furnaces designed for year-round air conditioning applications of up to five tons.

In the large equipment sizes, belt drive continues to be more desirable at this time, primarily because large residential and commercial structures do not conform to the relatively standard layouts characteristic of smaller installations.

By the same token, many of the direct drive advantages become less important in the larger sizes. Adequate maintenance for belt drives, as an example, is usually provided in larger home and commercial applications. The same is true of filter replacement or cleaning. So the direct drive advantages of less maintenance and dirty filter compensation become somewhat less important in larger sizes.

One other advantage of direct drive becomes minimized in larger size equipment, namely, quiet start-up. The extreme quietness of direct drive start-up can make the difference between a happy or annoyed customer in the small and medium size home, since the equipment is often located in a closet or alcove. But in larger installations, unit locations are not usually close to family living space, so the high-torque "chain reaction" start of belt drive is rarely objectionable. And, the extra air flow adjustment of belt drive is more desirable in these cases, for reasons already mentioned.

Case for Quality Direct Drive Systems Has Been Established

The case for quality direct drive systems has been established, not by this article, but by the efforts of those manufacturers who first recognized the superior value which it can offer to many segments of the market, then designed properly engineered direct drive systems which could produce that value. It has achieved the dominant position in the forced air field of heating and air conditioning, and not on price alone.

Unbiased engineers responsible for specification of forced air equipment at military bases have recognized that quality direct drive systems are more than equal to the task. In the case of General Electric alone, there have been numerous instances in which government specifications originally called for belt drive equipment in housing on various military bases. In every case, the specifications *were changed* to allow installation of direct drive units.

The changes were not made blindly, but only after the engineers concerned had opportunity to examine direct drive equipment, its performance, and ability to meet or exceed the specification requirements. It is anticipated that upcoming new Government Guide Specifications will include blanket provision for acceptance of properly qualified direct drive equipment.

ASHRAE Names 4 to Staff

NEW YORK CITY—Four new staff appointments have been announced by the American Society of Heating, Refrigerating & Air-Conditioning Engineers (ASHRAE), according to R. C. Cross, executive secretary.

They are: Andrew T. Boggs III — associate secretary; Martin A. Mayers — manager of Research; Herbert P. Tinning — technical secretary; and Robert J. Anthony — senior associate editor, *ASHRAE Journal.*

Formerly technical secretary of the society, Boggs has been elevated to associate secretary to assist the executive secretary in his various duties.

Currently, Boggs is concentrating upon membership and chapter relationships, including the "add-2,000-members" campaign, now underway. He is also undertaking certain special studies of operational factors.

Mayers, the new manager of research, will direct the society's extensive research program of grants-in-aid to colleges and private laboratories and will coordinate the activities of the Technical Committees "for maximum effectiveness to the society."

Before joining ASHRAE, he was chief design engineer with Sanderson & Porter, Inc., administering engineering and service sections relating to utility steam power plants.

Previously, he was chief mechanical engineer, special products, with Burns & Roe, Inc., where as head of the department he was responsible for the mechanical engineering design of aircraft engine test facilities, wind tunnels, and rocket launching facilities.

The new technical secretary, Tinning, will actively coordinate staff work upon national meetings programs with the Program Committee and will provide liaison with the Standards Committee.

He formerly served as assistant secretary—membership with the ASHRAE predecessor society, ASRE, and since has been associated successively with Dunham-Bush, Inc., as New Jersey field engineer and with Virginia Smelting Co. as a water chemical field engineer.

The appointment of Anthony as senior associate editor is in line with the *Journal's* enlarged editorial program, it was pointed out.

In addition to assisting the editor and working with others on the editorial staff, he will be active not only on the *Journal,* but Transactions, Preprints, and Bulletins.

Anthony has had more than 15 years' experience in the technical and engineering writing field as writer, editor, foreign correspondent, film director, and publications manager.

NEWS readers are invited to write to the editor giving their opinions on any subject of interest to the industry.

Imperial-Eastman Establishes New Plastics Division

CHICAGO — A new Plastics Div. has been established by Imperial-Eastman Corp. here, manufacturer of hydraulic and pneumatic components.

Named as manager of the new operation was A. C. Homer, former assistant general manager of the Eastman Div. of the parent company. The new division will be housed in the company's Manitowoc, Wis., plant. It will manufacture a broad range of plastic hose and tubing for pressure applications up to 3,000 psi.

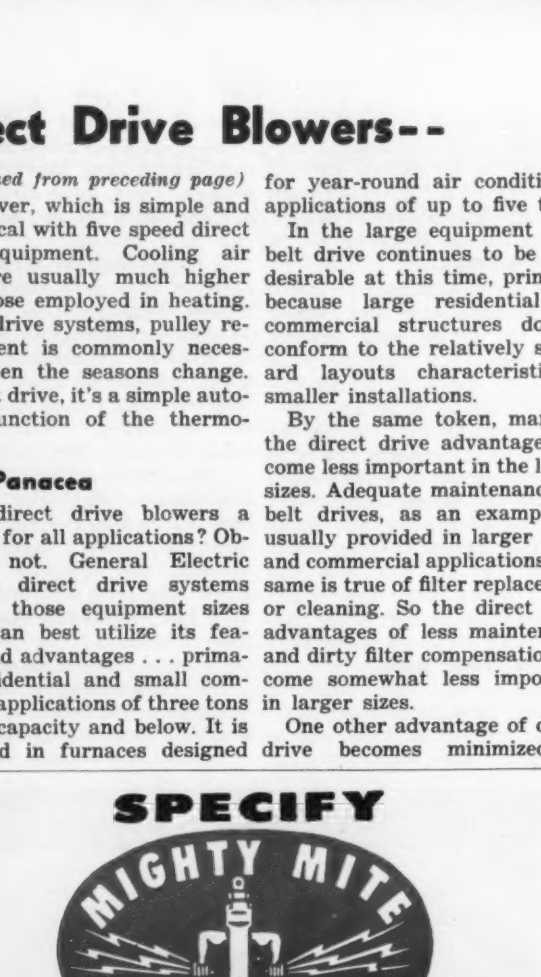
A key function of the new division will be the manufacture of Imperial-Eastman "Hytron" high pressure plastic hose.

"Hytron is a seamless extruded inner tube combined with a high tensile strength polyester braid reinforcement, plus a thermoplastic cover, which has the pressure capacities of wire braid hose plus added chemical and abrasion resistance," it was pointed out.

SPECIFY

MIGHTY MITE MOTOR PROTECTORS

STANDARD DESIGNS

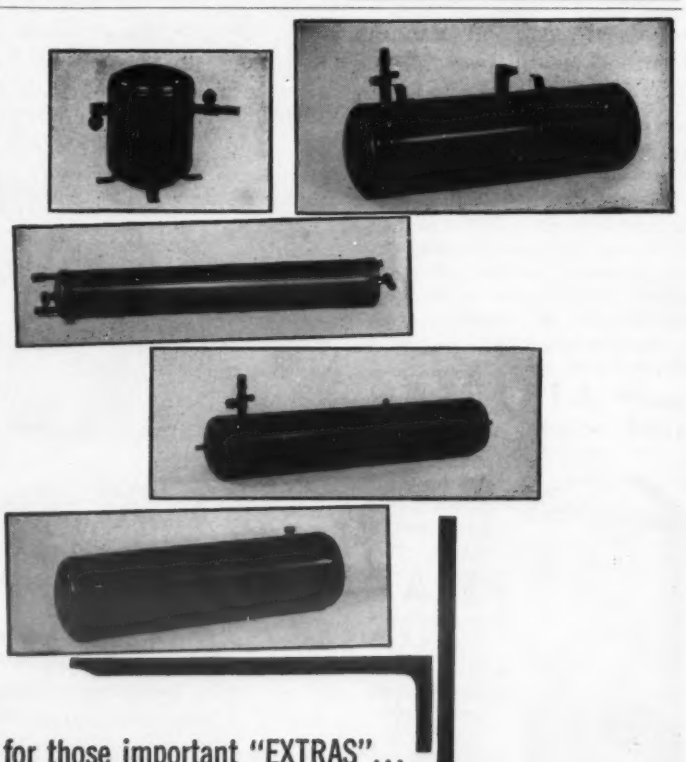


WRITE FOR CATALOG

MECHANICAL INDUSTRIES PRODUCTION CO.

223 ASH STREET • AKRON 8, OHIO

SOUTHERN PLANT: DANIA, FLORIDA



for those important "EXTRAS"...
lower cost—high quality—
prompt delivery

look to LEHIGH

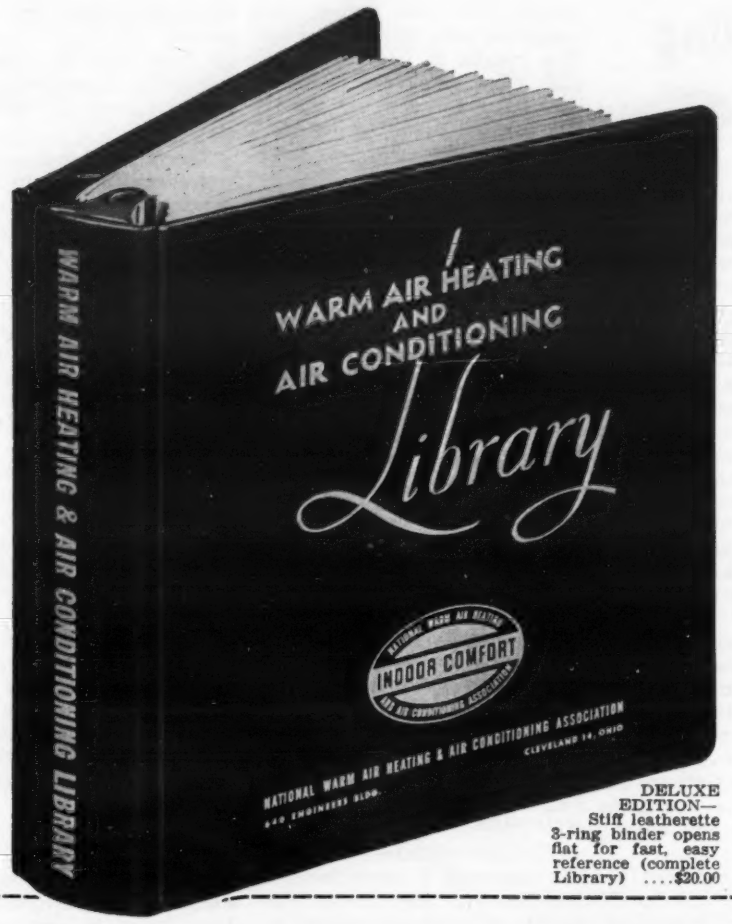
Liquid Receivers— 6" to 12" diameter, up to 60" long

Condenser Receivers— ½ to 5 h.p.

Designed and built to meet all your requirements.
U.L. approved. ASME coded.

LEHIGH

LEHIGH MANUFACTURING COMPANY,
Division of Lehigh, Inc., Easton, Pa.
Manufacturers of Hermetic and Open Type Condensing Units; Compressors; Receivers; Condenser Receivers.



DELUXE EDITION— Stiff leatherette 3-ring binder opens flat for fast, easy reference (complete Library) $20.00

NOW— *Air Conditioning, Heating & Refrigeration News brings you*

A LIBRARY OF HEATING PROFITS

FOR: THE MAN WHO SELLS!
THE MAN WHO INSTALLS!
THE MAN WHO SERVICES!

If your livelihood depends on the fast-changing, highly competitive heating and air conditioning industry, you cannot afford to be without the profit-packed latest edition of the WARM AIR HEATING & AIR CONDITIONING LIBRARY!

The most comprehensive collection of usable facts contained in one bookshelf-handy source, the "handbook of the industry" is a complete design and installation guide that combines "know-how" with "how-to."

The result of a continually expanding research program devoted to guaranteeing greater income for the man who thoroughly knows this expanding industry, the WARM AIR HEATING & AIR CONDITIONING LIBRARY contains easily understood manuals and worksheets, plus up-to-the-minute articles on a variety of warm air heating applications.

For practical men looking for practical information on specific subjects, individual manuals are available at unit prices. Because these manuals are constantly revised and up-dated for maximum usefulness, check those you now have to be sure they are the latest editions.

WARM AIR HEATING & AIR CONDITIONING - LIBRARY MANUALS

Widely accepted as standards of design, engineering and installation by federal, state and local officials, colleges and universities. They are especially prepared for use as field reference books, and for home study, vocational and correspondence school study and dealer training programs.

Warm Air Heating and Air Conditioning Digest..$1.50
Ideal for new men entering industry and as a refresher course for experienced men. . . . Basic principles of heat transfer, comfort, air-flow in ducts, perimeter heating and other subjects. **(1st Edition)**

Manual 1 — How To Make a Comfort Survey 1.00
A complete "how to" on: Checking single house plans for heat loss calculations. . . . Taking off heating plans from architect's blueprints. . . . Computing full areas and running foot of crackage of windows. **(4th Edition)**

Manual 2—How to Check Frame House Construction 1.00
Identifies various types of framing. . . . What to look for in construction which affects installation or performance of heating systems. . . . Installation practices. **(4th Edition)**

Manual 3 — Calculating Heat Losses 1.50
Discusses design temperature and use. . . . Areas of heat transmitting surfaces. . . . B.t.u.h. heat losses. . . . Heat loss calculation and factors for all types of building materials and construction methods. **(6th Edition)**

Manual 3 — Simplified Method ..... .75
Ideal for determining heat losses for average residence. . . . Combines conduction and convection (infiltration) losses through windows and doors. **(2nd Edition)**

Manual 4 — Warm Air Perimeter Heating 1.75
Design and installation data on perimeter-loop, perimeter-radial, crawl-space radial, crawl-space extended plenum, crawl-space trunk and branch, and crawl-space plenum perimeter systems using 5″ and 6″ pipes. **(6th Edition)**

Manual 5 — Design and Installation of Gravity Warm Air Heating System 1.00
Location and size of water air registers, return air intakes, and furnace. . . . System layout, . . . Installation and operation. **(Fifth Edition)**

Manual 6 — Adjusting Air Conditioning Systems for Maximum Comfort 1.25
Greater comfort performance with winter, summer or year-round systems. . . . Adjustment of room thermostat, controls, and system balancing. **(3rd Edition)**

Manual 7 — Design and Installation of Warm Air Winter Air Conditioning Systems $1.00
Designing forced warm air systems for houses up to 120,000 B.t.u.h. heat loss. . . . Selecting furnace, blower, duct, and register size. . . . Locating registers and return intakes. . . . System layouts. . . . Installation and operation. **(4th Edition)**

Manual 7A — Design and Installation of Warm Air Ceiling Panel Systems 1.00
For residential and small non-residential structures with heat losses not exceeding 120,000 B.t.u.h. . . . Furnace and blower size. . . . Layout of panel inlets and outlets. . . . Supply and return systems. . . . Panel construction. **(3rd Edition)**

Manual 8 — Application Guide for Residential Central Air Conditioning Systems (Winter and Year-Round) 1.50
Components of winter and year-round air conditioning systems. . . . Proper operation. . . . Good design and installation practices cited and illustrated. . . . Use it to sell "quality" systems. **(5th Edition)**

Manual 9 — Design and Installation of Warm Air Winter Air Conditioning Systems and Year-Round Air Conditioning Systems 1.25
Systems for residential, commercial, industrial and public buildings. . . . Also for structures where single-unit heat loss does not exceed 250,000 B.t.u.h. and where heat gain does not exceed 1.3 times sensible heat gain. **(7th Edition)**

Manual 9 Supplement ..... .50
Perimeter warm air heating and ventilating systems for buildings constructed on concrete slab floors. . . . Can be used to encourage architects, heating engineers, and school boards to use perimeter systems. **(1st Edition)**

Manual 10 — 4 Inch Pipe Warm Air Perimeter Heating 1.25
Design and installation of systems using 4-inch round pipes for warm air runs. Systems described are "low velocity". . . . May be used with furnaces rated at total static pressure of .20″ water gauge or comparable rating at sea level with temperature rise range of 70° - 100° F. through furnace. **(4th Edition)**

Manual 11 — Summer Air Conditioning 1.50
A tentative manual for design and installation of summer air conditioning systems for new and existing residences. . . . Heat gain calculation. . . . Design procedure. . . . Sizing of distribution systems. **(4th Edition)**

MANAGEMENT GUIDE for DEALER-CONTRACTORS

EXPERT technical knowledge is indeed required by the air conditioning and heating dealer, but unless he also knows how to manage his business, he probably won't make a decent profit today. This new book shows you exactly what has to be done, and even more important, how to do it. It represents the combined thinking and efforts of many manufacturers, wholesalers, and, of course, dealer-contractors. The methods and suggestions offered in this book are based on actual experiences that have produced profits for others. They will do the same for you. Prepared in loose-leaf binder form for your convenience, the Management Guide consists of 120 pages, 8½ x 11, with 96 illustrations. $18.

Please send me the following books:

Quantity			Total
_____	Deluxe Edition, Complete Library	@ $20.00 ea.	_____
_____	Digest	1.50	_____
_____	Manual 1	1.00	_____
_____	Manual 2	1.00	_____
_____	Manual 3	1.50	_____
_____	Manual 3— (Simplified)	.75	_____
_____	Manual 4	1.75	_____
_____	Manual 5	1.00	_____
_____	Manual 6	1.25	_____
_____	Manual 7	1.00	_____
_____	Manual 7A	1.00	_____
_____	Manual 8	1.50	_____
_____	Manual 9	1.25	_____
_____	Manual 9 (Supplement)	.50	_____
_____	Manual 10	1.25	_____
_____	Manual 11	1.50	_____
_____	Management Guide	18.00	_____

Air Conditioning, Heating & Refrigeration NEWS, 450 West Fort St., Detroit 26, Mich.

☐ **I enclose check in full amount** 10-2-61
☐ **Bill me direct**

Name .....
Company .....
Address .....
City .....**Zone**.....**State**.....

AIR CONDITIONING HEATING & REFRIGERATION NEWS
The Newspaper of the Industry

Combination Heating and Summer Cooling Systems for Residences Offer Challenge

By Kenneth Behr, Chief Application Engineer
Lennox Industries, Inc.

Adding summer cooling to an existing heating system or designing a combination heating and cooling system for a new home can be a real challenge to many sales engineers, installation and service people. The many types and variations in equipment, the almost endless size combinations of heating to cooling, plus differences in air distribution systems, require that he become well informed on at least several important bench marks.

All these variations and problems are a result of the differences in outdoor dry-bulb and wet-bulb temperatures from one end of the country to the other. This is true for both winter and summer. House construction and orientation affect equipment sizing. High dry and wet-bulb temperatures require larger size in cooling equipment, yet a high wet-bulb temperature usually calls for lower air volumes in order to do a better job of dehumidification. Then you have the large glass areas exposed to the afternoon sun which calls for more size to the equipment in many cases.

A typical cold climate combination may be a 2-ton air conditioning unit with a 120,000 or even a 140,000 Btuh input furnace. In a humid climate, this may call for a cooling air volume as low as 600 to 650 cfm. The 120,000 Btuh input furnace would deliver approximately 900 cfm when adjusted for a 100° temperature rise through the furnace. In this case, the air distribution system should be sized on the heating air volume.

This same house in a hot climate may call for a 3-ton air conditioner with an 80,000 Btuh input furnace. In a dry climate the cooling air volume would be in excess of 1,200 cfm; whereas, for best heating performance, 600 to 700 cfm would be proper. In this case, the air distribution system should, of course, be sized on the cooling air volume. Fortunately, air volumes match up much better than this on the majority of installations.

The important bench marks in common use that can be helpful to designers and others are the figures used to determine the proper heating and cooling air volumes.

Recommended cooling air volume ranges from 300 to 420 cfm per 12,000 Btuh. Several association manuals and various manufacturers' manuals will show charts and maps on the proper usage of the above figures. Wet, cool regions may design for only 300 cfm per ton. This results in less air volume and more moisture removal. Hot, dry areas may use the 420 cfm per ton figure to get more sensible cooling and less moisture removal.

Most areas use from 360 to 400 cfm per ton in their calculations. When the equipment size is determined, (by calculating the heat gain of the home), simply multiply the cooling unit capacity in tons by the recommended factor for your area to arrive at total recommended cooling air volume.

4 Air Changes per Hour Is Usual Practice

Recommended heating air volume is generally based on a 90° to 100° temperature rise over the heating unit for residential application. Using standard FHA construction as a guide, the usual result is approximately four air changes per hour in the conditioned space. Experience has proven these figures acceptable in the colder climates where excessive air motion easily results in objectionable drafts.

Warmer climates frequently can live with a lower temperature rise over the furnace which results in more air volume. Exposed walls, glass, ceiling, and floor surfaces are warmer and, therefore, the danger of an objectionable draft is less. Heavily insulated homes end up with smaller heating requirements, yet their need for proper air in circulation is as great or greater than the more conventional construction.

Therefore, it is suggested that you check the 90° to 100° temperature rise air volume total against the total arrived at with four air changes per hour. Use the larger of the two.

After the heat loss is calculated and the equipment size is selected, (if the unit doesn't already exist), multiply the Btuh output of the furnace in thousands by the figure 10.3 to arrive at the air volume for a 90° temperature rise through the furnace. Use the figure 9.3 for a 100° temperature rise. Example: 100,000 Btuh output divided by 1,000 = 100 x 9.3 (factor for a 100° temperature rise) = 930 cfm.

To determine air volume by using the air change method, multiply the length by the width by the height of the space to be conditioned and then divide by 15. Example: 50 ft × 35 ft × 8 ft = 14,000, divided by 15 = 933 cfm.

An important item to remember for heating in particular, is that the blower be adjusted to deliver air continuously any time there is any appreciable demand for heat. This helps to maintain more even temperatures from floor to ceiling and from one room to the next. This

Table I

Tons of Cooling (12,000 Btuh)	Cooling Cfm Range 300-420 Cfm/Ton	Heating Btuh Input	Heating Cfm Range Based on Temp. Rise 100°-90°	Blower Motor Hp Heating Only Belt Drive	Blower Motor Hp Sized for Cooling Belt Drive	Blower Motor Hp Heating Only Direct Drive	Blower Motor Hp Sized for Cooling Direct Drive
		50,000	370- 410	....	....	1/15	1/10
1½	450-630	65,000	485- 535	....	....	1/10	1/10
		80,000	595- 660	1/6	1/6	1/6	1/6
		80,000	595- 660	1/6	1/6	1/6	1/6
2	600-840	100,000	745- 825	1/6	1/6 or 1/4	1/6	1/6
		120,000	890- 990	1/6 or 1/4	1/6 or 1/4	1/3 P.S.C.	1/3 P.S.C.
		140,000	1,040-1,155	1/4	1/4	....	....
		80,000	595- 660	1/6	1/3	1/6	1/3 P.S.C.
		100,000	745- 825	1/6	1/3 or 1/2	1/6	1/3 P.S.C.
3	900-1,260	120,000	890- 990	1/6 or 1/4	1/3	1/3 P.S.C.	1/3 P.S.C.
		140,000	1,040-1,155	1/4 or 1/3	1/4 or 1/3	....	....
		160,000	1,190-1,320	1/4 or 1/3	1/4 or 1/3	....	....
		180,000	1,340-1,485	1/3	1/3	....	....
		120,000	890- 990	1/6 or 1/4	1/2 or 3/4	....	....
		140,000	1,040-1,155	1/4 or 1/3	1/2 or 3/4	....	....
4	1,200-1,680	160,000	1,190-1,320	1/4 or 1/3	1/2 or 3/4	....	....
		180,000	1,340-1,485	1/3	1/2 or 3/4	....	....
		200,000	1,490-1,650	1/3	1/2 or 3/4	....	....
		140,000	1,040-1,155	1/4 or 1/3	3/4	....	....
5	1,500-2,100	160,000	1,190-1,320	1/4 or 1/3	3/4	....	....
		180,000	1,340-1,485	1/3	3/4	....	....
		200,000	1,490-1,650	1/3	1/2 or 3/4	....	....

Chart above shows recommended cooling cfm range and the cfm range commonly used for good heating with the various unit combinations. It also shows typical motor sizing. Due to different types of heating units and coils, two possible motor sizes are shown for some combinations. Blank spaces indicate that the combination is normally not practical or available.

usAIRco

modu-aire
Hideaway Model
With Extended
Drain Pan

Model illustrated:
M.H. Hideaway Modu-aire

Entirely new usAIRco slim line (8¾" overall) Modu-aire Hideaway Unit. New extended drain pan completely surrounds whole unit to catch any moisture. Condensate problems are entirely eliminated. Built to last a lifetime.

This slim line unit is particularly suitable for hotels, motels, office buildings, apartments or any multiple structure where ceiling height or closet space is limited.

WRITE FOR BULLETIN "96-B"

United States Air Conditioning Corporation
Dept. 77 Delaware, Ohio
SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES
Consult your Telephone Directory Yellow Pages
Export Office, 13 E. 40th Street, New York 16, N.Y., USA

SPECIAL DELIVERY BY ROCKET?

No. we aren't using the new ballistic missiles yet, but maybe some day. In the meantime, Harry Alter gives you the fastest possible service. Your orders are handled with *careful* speed. Complete inventories and streamlined methods assure truly snappy service.

We're Real Specialists in
REFRIGERATION • AIR CONDITIONING • ELECTRIC MOTORS
SUPPLIES and PARTS

SAVE MONEY, time and effort by ordering from our new *Dependabook* the most complete catalog of all. 250 pages. Over 10,000 items carried in stock. *Wholesale only.* Your orders filled really fast by mail, or they can be picked up at one of our six big warehouses.

Write on your letterhead for the 1961 DEPENDABOOK . . .
Also our monthly Flyer of surplus and close-out Bargains.

THE HARRY ALTER CO., INC.

1717 S. Wabash Av. Chicago 16, Ill.	134 Lafayette St. New York 13, N.Y.	2332 Irving Blvd. Dallas 7, Texas	695 Stewart Ave., S.W. Atlanta 10, Ga.

FREE PARKING AND FAST COUNTER SERVICE AT THESE 4 BIG WAREHOUSES

is usually true for cooling too.

After the equipment size is selected and the recommended cfm arrived at by the above methods, a check should be made to determine whether or not the air handling equipment can produce the required air volume for both heating and cooling without objectionable drafts, noise, service problems and that it will do so efficiently.

Many furnaces are equipped with belt-driven blowers using adjustable motor pulleys. The adjustable pulley is then set at the start of each season for the proper air volume. On a majority of installations a compromise is made between recommended heating and cooling cfm and left at this setting all year long. This is acceptable when heating and cooling cfm differences are not great.

In a few cases, two-speed motors have been used to handle the very unusual jobs where there is a big difference between heating and cooling air volumes. Some feel that a better solution to this problem is a separate blower for both heating and cooling.

Direct Drive Blower

Gaining fast in popularity is the direct drive blower which is equipped with a multispeed transformer controller. The installer can select the desired speed taps for heating and for cooling and wire it accordingly for that particular job. Some manufacturers provide a simple speed selector switch in conjunction with the above. This allows the homeowner to switch from the heating to cooling air volume. The objective, of course, is to adjust as closely as possible to these recommended cfm figures regardless of the type of equipment used.

It is not possible to print one standard chart or provide a simple formula which will show the proper blower, motor and drives to use with the countless variations in equipment, (both furnaces and coils), and distribution systems. It is usually quite easy to choose the proper air handling equipment or combination on new installations by referring to the manufacturer's blower performance data.

Working on an existing heating unit can be quite a different story. If a belt-driven blower exists, it is usually quite simple to change either the motor or the drives or both. Changing the blower, itself, usually will be adequate.

If it happens to be a direct drive blower, it is possible that the furnace is designed to allow a complete change in blower and motor to a size large enough for the added air volume. Sometimes the same direct drive blower may be used with only a change to a larger motor. In other instances, the range is from no change required at all to a drastic step such as a change of the entire heating unit. Then, too, don't forget the possibility of separate blowers for heating and cooling.

CFM Required and CFM Available Is Key

The key point in all cases, however, is the cfm required for the job and the cfm available with the equipment you intend to use.

Table 1 shows the variations between the recommended cooling cfm and the cfm normally used for good heating only with various unit combinations. It also shows typical motor sizes for heating only and the required motor size when cooling is added. It is true that these figures will vary slightly with different manufacturers' equipment but they do show some of the variations that have been discussed here.

Differences in heating and cooling cfm also affect the air distribution system. As stated earlier, it is wise to size the distribution system for the larger of the two air volumes. To be sure of this, it should be done on a room-by-room basis.

While total cfm may be larger for the heating requirements in a cold climate, a room with a large glass area exposed to the afternoon sun may actually require more air volume on the cooling cycle. Here again, associations' and manufacturers' manuals help in the sizing of ducts, branches and registers.

The existing distribution system may have been sized for heating only. The room-by-room heat gain calculation will show when and where it is necessary to add a run in order to handle the additional air volume sometimes required. Generally, however, heating duct systems are designed for a rather low static pressure and low velocities, As much as 35% more air volume for cooling can often be handled with the existing distribution system without serious problems.

Install Volume Dampers In Each Supply Branch

It is good practice to install, (if none exists), a volume damper in each supply branch on the job. Most of the balancing can be done here, leaving the volume control in the register or diffuser for fine tuning or the heat-to-cool changes. This helps reduce air noise at the outlet while still retaining maximum control of air direction.

To obtain even temperature distribution on some installations it is necessary to rebalance the system at the start of each season. This is easily accomplished once the adjustment has been made *and marked* for each air volume. Again, continuous air circulation is the big helper in this respect.

The perimeter floor diffuser ranks among the highest for heating and cooling comfort and performance. It not only blankets the exposed surfaces but directs air up—not on occupants. It introduces air on the room side of drapes for maximum air circulation within the conditioned space.

Perimeter distribution is most desirable particularly in the colder climates. High wall and ceiling diffusers are common and acceptable in warmer climates for both heating and cooling.

The inside wall baseboard register which discharges air horizontally usually needs attention when cooling is added to an existing heating system. Due to the result of lower return air temperatures, the cooling equipment capacity is reduced—running time of the compressor is increased and the floor to ceiling temperature differences are greater. They can all result in customer complaints.

Possible solutions are to change to an outlet which discharges air upward. An accessory item may also be attached to the existing register which directs the air upward. The other remaining solution is to relocate the opening and choose one of the recommended diffusers described earlier.

Where the main supply or return ducts are short and direct to the conditioned space, it may be desirable to line the inside of these ducts and even the plenums with an acoustical material to help eliminate air and mechanical noise.

The old, familiar egg crate idea made from acoustical insulation can work wonders on tough noise problems. This usually applies more to existing distribution systems than on new, combination jobs.

With few exceptions, ducts that are exposed in areas that are not conditioned require insulation and a moisture barrier to prevent condensation.

The experienced man takes all these items in stride. To him, this is all simple. He has learned to study the manufacturer's performance data on the equipment and to apply it properly. He studies design manuals to learn the *do's and don'ts* on good air distribution. He has thoroughly learned how to figure air volume requirements for both heating and cooling and then how to handle it properly.

Frozen evaporators and compressors that were ruined because of liquid slugging caused by "not enough" air across the coil are profit takers. All this digs deep into the pocket of the man who is uninformed. It can happen if attention isn't given to some of the things discussed here

SELL THE HIGH PROFIT LINE!

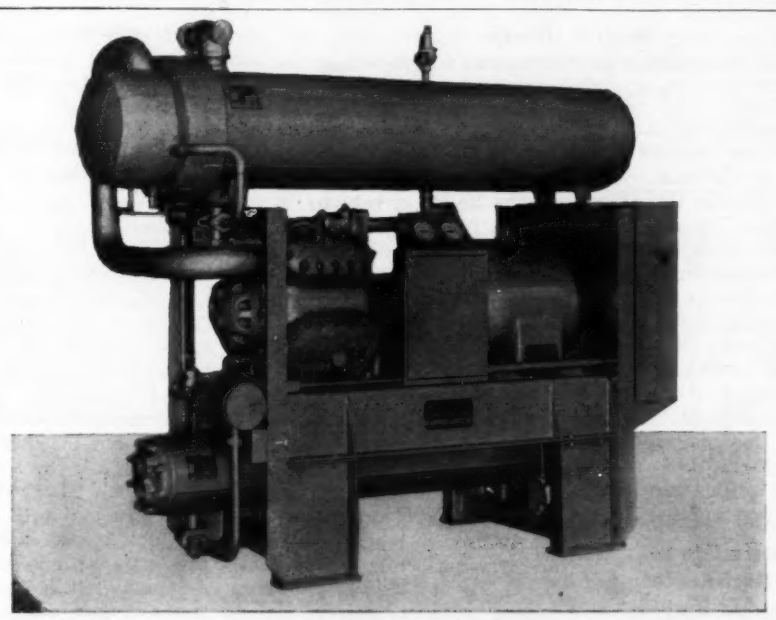
Walton HUMIDIFIERS

RESIDENTIAL—COMMERCIAL
27 MODELS FOR EVERY TYPE OF HEAT AND EVERY NEED
Walton LABORATORIES, INC.
1186 Grove Street
Irvington 11, New Jersey

For Your Reprint Copy

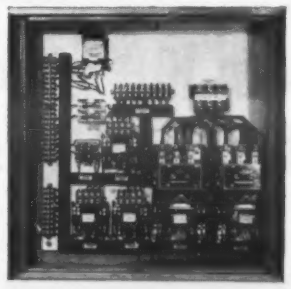
"Emergency Diagnosis, Repair of Hermetic Unit Electric Components," by John L. Zant, mail this ad with your name and address to: Air Conditioning, Heating & Refrigeration News, 450 W. Fort, Detroit 26, Mich.

Only 25¢ each.



BELL & GOSSETT specifies Furnas Electric Controls

Rigid performance standards set by Bell & Gossett demand that only highest quality components be used in their equipment. For this reason Furnas Electric starters and contactors were chosen for B & G Package Liquid Chillers. These controls assure dependable operation and top-quality performance.



Furnas components in this B & G electrical control panel are mounted, wired and interlocked for trouble-free automatic operation.

In-between sizes, dual voltage coils, silver-cadmium oxide contacts and other popular Furnas features make Furnas controls well suited for your air conditioning and refrigeration requirements. Compact construction, front accessible wiring terminals and uniform mounting dimensions make them highly adaptable to simplified panel mounting.

Write today for full information—
1111 McKee St., Batavia, Illinois

A100

FURNAS
ELECTRIC COMPANY
BATAVIA, ILLINOIS

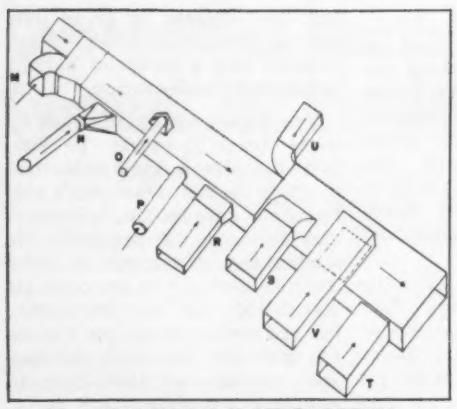


FIG. 1 COMBINATIONS OF RETURN FITTINGS

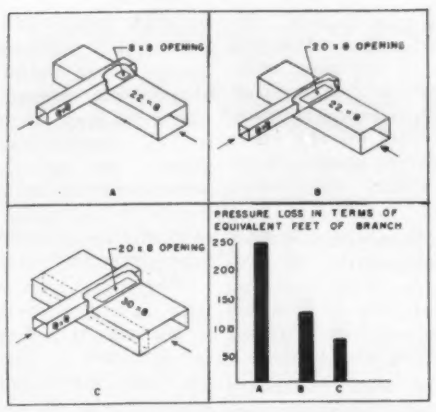


FIG.2 FACTORS WHICH INFLUENCE RETURN PRESSURE LOSSES

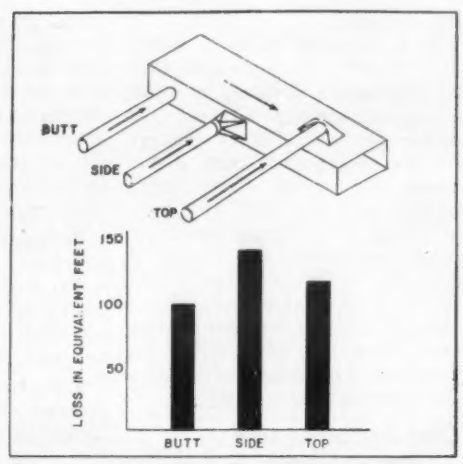


FIG. 3 COMPARISON OF EXTENDED PLENUM FITTINGS WITH BUTT JUNCTION

Investigation of Pressure Losses Through Fittings Used In Return Air Systems

By J. H. Healy
Research Assistant in Mechanical Engineering
University of Illinois

This project was initiated at the request of the Manual Committees of the National Warm Air Heating and Air Conditioning Association. The investigation has been conducted in the Mechanical Engineering Laboratory of the University of Illinois under the terms of a cooperative agreement between the University and the Association. The principal objective of the investigation is to expand and supplement the information presently available in the Association manuals on pressure losses in return air systems.

Problems Traced to Excessive Resistance In Return Air System

Field investigations have indicated that many heating and cooling problems can be traced to excessive resistance in the return air system.

The results of this investigation have shown that return air fittings have greater pressure losses than supply fittings.

Therefore, proper design is essential to the elimination of excessive losses in returns. A few of the factors which seriously affect the pressure losses through return air fittings will be discussed.

Combinations of Fittings Being Investigated

Fig. 1 shows the various combinations of fittings currently under investigation. The arrows indicate the direction of air flow. Some of the fittings, such as combinations V and T are commonly used in residential return air systems, while combinations N, O, R, and S which are extended plenum supply fittings through which the flow has been reversed, are seldom used. The purpose of including these fittings in the investigation was to determine their effectiveness in reducing pressure losses if they are used in return air systems. Combinations M and U are trunk duct fittings and were also included to determine what, if any, advantage might accompany their use.

3 Arrangements of Combination V

In Fig. 2, three arrangements of combination V and the corresponding pressure losses in equivalent feet of branch duct are shown. Combination V is equivalent to a "panned joist" space merging into a return air plenum, at right angles and below the joists.

Arrangement "A" in the upper left hand corner of the slide shows an 8-in. by 8-in. rectangular branch duct merging into a 22-in. by 8-in. rectangular plenum. The opening connecting the two ducts is 8-in. by 8-in. Assuming a velocity of 400 fpm in the branch and 800 fpm in the plenum, the loss through this arrangement would be 248 ft of branch duct.

Arrangement "B" is under the same conditions and has branch and main ducts with the same dimensions but the opening is enlarged to 20-in. by 8-in. The loss is now reduced to 120 equivalent ft. Thus by making the opening the full width of the plenum a reduction of over 50 percent in the loss was realized in comparison to Arrangement "A".

Arrangement "C" shows the interrelation between the dimensions of the branch and those of the main duct. The dotted line represents the difference in plenum dimensions between Arrangements "B" and "C". The conditions are again the same, 400 fpm in the branch and 800 fpm in the main. The opening is again 20-in. by 8-in. but the plenum has been enlarged to 30-in. by 8-in. The loss in equivalent feet for this arrangement is 83 ft which is a 30 percent reduction from Arrangement "B".

Indicate Effects of Branch Openings, Return Air Plenum Size

These examples indicate the effects of branch opening and return air plenum size. In addition to these factors, the air flowing in each duct affects the pressure loss. That is, for these same arrangements, different pressure losses would result from different velocities in the branch and main. The effects of these factors can be tabulated as simple ratios for a wide range of sizes and velocities. The pressure losses for conditions other than those used for the examples could then be determined from

Comparison of Pressure Losses

Fig. 3 is a comparison of pressure losses in equivalent feet of branch duct for a butt junction in comparison with the losses with the flow reversed through side and top extended plenum takeoff fittings. It should be noted that the extended plenum fittings have the air flowing in a direction reversed from the usual flow on the supply side of the system. The bar graph indicates that the butt fitting has a loss of 100 equivalent feet while the side and top extended plenum fittings have 140 and 120 equivalent feet of loss, respectively.

Simple Butt Fitting Has Lower Loss

Thus in the return system the simple butt fitting has a 20 percent lower loss than the top extended plenum fitting and a 40 percent lower loss than the side extended plenum fitting. These data indicate, therefore, no advantage in using the extended plenum fittings as return air fittings. Since these fittings were designed to provide the most efficient path for the supply side, it is not surprising that they are ineffective as return system fittings.

The flow in the branch and main both have an effect on the pressure loss. For example, if the velocity in the main in Fig. 3 were increased to 1000 fpm, the butt junction loss in equivalent feet would increase by 50 percent.

3 Rules To Follow

The information presented here represents only a part of those data which have been collected. When all of the information has been compiled, the results will be incorporated into the National Warm Air Heating and Air Conditioning Association design manuals. The results of the investigation to date indicate that the following rules should be followed in the design of return air systems:

1) Keep fitting connections as large as possible.

2) Use the most direct path from the return air grille to the furnace and avoid twists and turns.

3) Ducts and return grilles should be designed and selected carefully to insure the accommodation of the required airflow rate.

Proper Meat Cooling is provided by space-saving Krack Semi-Circular Unit Coolers that maintain correct temperature and humidity balance to prevent shrinkage.
Safe Dry Product Storage is provided by ceiling mounted Krack BUC Product Coolers that maintain a constant temperature.
Frozen Food Walk-in Coolers are kept at −10°F. temperature by trouble-free Krack lo-temp, hot gas defrost units.
Low Cost Air Conditioning is provided by ceiling mounted Krack Komfort Master air handling units that are "whisper quiet."
You can count on KRACK to deliver FULL-RATED CAPACITIES!

ADVANTAGES IN SPECIFYING KRACK EQUIPMENT
You can be sure of ratings and equipment that match the job. You gain advantage of lower bidding...no need to specify oversize equipment. You save installation and maintenance costs.

KRACK REFRIGERATION APPLIANCES, INC.
Manufacturers of Freon or Ammonia, Recirculated, Flooded or Direct Expansion Heat Transfer Equipment

MAIL COUPON FOR FREE BULLETIN 600
REFRIGERATION APPLIANCES, Inc., 901 W. Lake St., Chicago 7, Ill.
Name_____
Firm_____
Street_____ City_____ Zone____ State_____

Handy Tube Bender
Smoothly Bends any pipe or Tubing ⅜"-1⅛" O. D.

• Just a twist of the wrist assures perfect, even bends — right angle, any angle, U and offset. Save enough on ONE job to pay for your HANDY BENDER.

See your supply house—or write for free folder today.

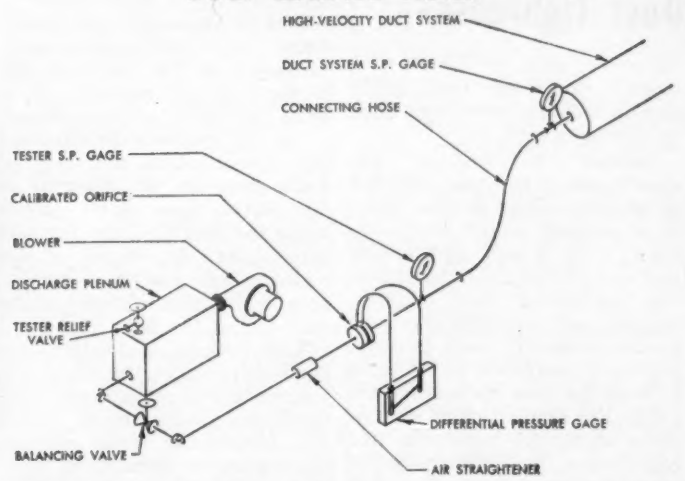
HOLSCLAW BROS., INC.
428 N. Willow Road • Evansville, Indiana

Methods of Testing High Velocity Duct Systems for Air Tightness

The high velocity air conditioning system is a relatively new concept in air conditioning. Its application has of necessity involved the use of some new methods in duct sealing, and in testing for leakage in duct systems. In a discussion before the Western Air Conditioning, Heating and Ventilating Conference, a discussion prepared by S. D. Sheff of Pacific Air Products Co., specialists in high velocity air distribution systems, described some of the accepted techniques in use today. Presented here are the main points made in his talk, together with some information developed in a following discussion period.

TEST BY STATIC PRESSURE LOSS measurement for a specified time interval involves sealing the duct run and pressurizing it. Supply air from a small blower or air compressor enters through a short valved pipe with a static pressure gauge mounted in the line adjacent to the duct. When the duct pressures reached the specified value, the valve is closed tight. Time required for the system to reach its allowable static pressure drop is checked against the specified time intervals.

DUCT LEAKAGE TESTER

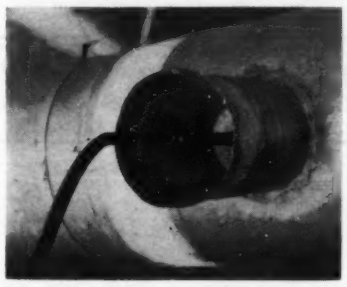


EVALUATING DUCT EFFICIENCY in terms of air actually lost requires a test setup such as shown in the drawing. It features use of a calibrated sharp-edged orifice which actually measures the quantity of air lost through leakage. Test device consists of low-cfm, high-pressure blower discharging into a plenum and then through a calibrated metering tube into the duct system. A balancing valve in the line regulates flow of supply air, and a differential pressure gauge measures the drop across the orifice.

After a duct system has been installed, one important step remains before it is acceptable to the owner, the architect, and the engineer: It must pass a test for air-tightness.

High-velocity duct is a conduit for air in the same sense that piping is a conduit for water, gas, or other fluids. But while there are similarities, there are also important differences. For example, let us consider a building water system. Water piping handles relatively high-pressure low-volume fluid. A high-velocity duct system handles low-pressure high-volume air, the pressure ranging, roughly, from ¼ to ½ psi. Leaks in building water systems are usually readily detected and located.

Water leaks, while easily detected and located, are costly in damage to property and personal dignity as well as in repairs. Piping systems carrying water and other high-pressure or noxious fluids must be 100% tight.



SEALING A DUCT for testing is an important preliminary to any test. Common positive method shown here is to close the ends of the main duct and branch take-offs with sheet metal caps fabricated to size. Sealing compound is applied to the exterior of each opening, the cap is installed. If necessary, sheet metal screws are used to fasten cap to duct; the closure joint is taped, then coated with a paint sealer.

LESS COSTLY duct-sealing procedure employs good-grade toy balloon inserted into duct or branch opening, inflated until it fills the opening, and is then tied off. To hold the balloon in place, two pieces of tape are criss-crossed over the end of the duct. When pressure is applied to the system, the balloon is distorted and pressed against the duct wall forming an air-tight seal.

ORIFICED METER UNITS for measuring duct leakage is this Pacific Air Products Co.'s "Port-O-Lab." It has its own blower, three switch Magnehelic Gauges (one for each of three pressure ranges) and a static pressure gauge. Unit may also be used for checking external static pressures, velocity pressures, and air velocities, and drops across attenuator boxes, coils and filters.

Air Leaks More Elusive Matter

Correcting leaks in an air duct system is a more elusive matter. Air leaks are often difficult to detect and to locate. They cause no ceiling discoloration and no damage to property. However, since air is the medium for bringing heat to or extracting heat from a conditioned space, air leakage represents a waste of heating and refrigeration capacity.

Appreciable leakage over a protracted operating period can add up to a sizeable amount of money lost in plant operation. On the other hand, a perfectly air-tight duct job adds substantially — even prohibitively — to first cost: in fabrication, installation and testing. Most engineers who design and contractors who install high-velocity air conditioning systems, recognizing this fact, are willing to settle for something less than perfection.

How Tight Should High Velocity System Be?

But how tight should a high-velocity duct system be? And how should duct tightness be established? Answers to these questions appear in specifications outlining test procedures, allowable static pressure losses, and the like. These vary widely, and the subject has become a matter for controversy.

The basic problem boils down to this: How much air leakage can a high-velocity air conditioning system afford? Or, for a given air conditioning system, how leak-efficient should duct-work be?

Conventional low-velocity duct installations without taped field joints may lose through leakage as much as 10-15% of the air handled. Development of high-velocity air distribution has brought with it the need for duct air-tightness (and, incidentally, a re-examination of low-velocity duct tightness as well). This is entirely logical because higher duct velocities mean higher operating static pressures with consequent greater air leakage through given openings.

Air Leakage Wastes Cooling, Heating, Causes Faulty Operation

Air leakage means waste of refrigeration and heating capacities and hence increased plant operating costs. Then too, excessive leakage, resulting in high duct pressure losses, can cause faulty operation of system attenuator boxes.

A duct system must permit proper function of all air-distribution components and deliver the ventilating and conditioning medium—air—to the conditioned space and not to the attics, ceiling spaces, or wall spaces through which the ducts pass. To insure that requirements for tightness are met, each main is sealed off and pressurized until the specified static pressure is reached. Then any one of several test procedures (as specified) is applied.

Sealing Main Duct Is Important Step

Sealing the main duct for testing is an important preliminary to the test itself. A common positive method used is to close the ends of the main duct and its branch take-offs with sheet-metal caps fabricated to size: Sealing compound is applied to the exterior of each opening; the cap is installed; if necessary sheet metal screws are used to fasten cap to duct; the closure joint is taped, then coated with a paint sealer.

When the test has been completed, the steps are reversed: the joint untaped; the screws removed; the cap pried off; the duct ends cleaned. Making and unmaking one such closure currently costs the contractor about $4.50 to $5.

At an Arizona job site, I saw an equally effective and far less costly duct-sealing procedure used by a local air conditioning contractor. With this method, a toy balloon is inserted into the duct or branch opening, inflated until it fills the opening and then tied off. To retain the balloon in place, two pieces of tape are criss-crossed over the end of the duct. When pressure is applied to the system, the balloon is distorted and pressed against the duct wall forming an air-tight seal.

Only a few simple precautions are necessary:

First, the toy balloon should be of good quality. (Penny balloons are unsuitable. Pur-

(Continued on next page)

SC **Cut Idle Time This Winter**

• • •

DON'T HOLD UP LAGGING JOBS FOR HIGHER TEMPERATURES

Use CLAIR COAT Lagging Adhesive

for fast lagging even in a damp 40° F.

And if CLAIR COAT should freeze solid, it is still usable

Other CLAIR COAT Advantages:

FAST SETTING — sets almost immediately
NONFLAMMABLE — fire retardant film
STRONGEST PERMANENT BOND — by comparative tests
STEAM PROOF — WATER PROOF — VERMIN PROOF
NON-TOXIC — ONE COAT NEEDED — Fine appearance — easily washable — long lasting

Also-NEW ST. CLAIR LAP SEALING ADHESIVE #45007

MANY IMPORTANT ADVANTAGES — write for prices — samples of either or both adhesives

ST. CLAIR RUBBER CO.
Empire Building, 107 Clifford • Detroit 26, Michigan

Deluxe Resort Living IN LOS ANGELES

. Centrally Located - Access to all Freeways . Drive-In Entrance - Ample Parking . Public transportation at Door . 400 Comfortable Rooms . Coffee Shop . Amber Room Cocktail Lounge . Heated Swimming Pool in a Garden Setting.

Wide choice of beautifully redecorated rooms with TV now available from a single to a twin - bedded Guest Sitting Room...Many with Air-Conditioning.

STANDARD ROOMS		NEW BED-SITTING ROOMS	
Single	$5.00 - $6.00	Single	$ 8 to $10
Double Bed	$7.00 - $8.00	Double Bed	$10 to $12
Twin Beds	$7.50 - $8.50	Twin Bed	$12 to $14
		Roll-away Bed	$2

Figueroa HOTEL

Honoring All Major Credit Cards

O. L. RONE Manager

MAdison 7-8971

OLYMPIC AND FIGUEROA STREETS
LOS ANGELES 15, CALIFORNIA

Duct Tightness--

(Continued from preceding page)
chased in gross lots, good-quality balloons cost from three to five cents each.)

Second, the balloon size should exceed the duct diameter by several inches so that when it is inflated (short of its capacity), it is soft and pliable and will fill the irregularities of the galvanized duct surface. Making and unmaking one such closure currently costs the contractor a maximum of 25 cents.

Tests for duct air leakage are generally conducted in one of three ways: By inspection and observation, by measurement of static-pressure loss for a specified time interval, and by evaluating duct efficiency in terms of air actually lost. The balance of this discussion will concern itself with a description and analysis of these three test methods.

By Inspection, Observation

Test by inspection and observation requires sealing and pressurization of the duct run. Air is supplied continuously by a small blower or air compressor, or by the system's air handling unit, to maintain the specified static pressure. An observer at duct level then slowly moves along the length of the run and listens for the sound of air leaks or feels for air movement around the circumference of the duct and at the field joints.

This test is qualitative; depends entirely on the observer's judgment, and detects only comparatively large leaks which are usually the result of poor fabrication or installation practices. It yields no information about quantities of air that are lost.

By Static Pressure Loss Measurement

Test by static pressure loss measurement for a specified time interval involves sealing the duct run and pressurizing it. As in the case of the Inspection and Observation Test, this is accomplished by means of a small blower or air compressor furnishing the supply air. In this test, however, the air is supplied through a short valved pipe with a static pressure gauge mounted in the line adjacent to the duct.

When the duct pressure has reached the specified value, the valve is closed tight and the blower or compressor shut off. The time required for the system to reach its allowable static pressure drop is checked against the specified time interval. It should be noted that this procedure is identical with tests of pipelines handling fluids under high pressures.

Suppose we consider a specific example. Given a high-velocity duct run for which the specifications state:

" . . . shall be tested by placing the sealed section under an air pressure of 8 in. of water. The air pressure in the duct at the end of a five-minute test period shall be not less than 5 in. of water . . ."

Let us assume the duct volume is 100 cu ft. This represents a run of about 183 ft of duct with an average diameter of 10 in. or 127 ft of duct with an average diameter of 12 in. A loss of 3 in. of water under the conditions described represents a total loss of about ¾ cu ft of standard air for the 5-minute interval, less than 0.2 average cfm.

From this discussion, we may conclude that there is no universal answer to the question "For a high velocity duct system, what is a reasonable static pressure drop over how long a time interval?" For air lost through duct leakage depends on duct volume as well as air pressure drop.

A duct system before pressurization is already filled with air at atmospheric pressure. To pressurize the system, relatively small quantities of air are needed. If the sealed duct system leaks, relatively small quantities of air lost bring about depressurization. The main question pertaining to duct tightness is "How much air leakage can a high-velocity air conditioning system afford?"

By Determining Air Loss Quantitatively

Evaluating duct efficiency in terms of air actually lost requires a simple test setup using a calibrated sharp-edged orifice to measure the quantity of air lost through leakage. The test device consists of a low-cfm high-pressure blower discharging into a small plenum and then through a calibrated metering tube into the duct system. The metering tube consists of a short section of 1½-in. or 2-in. pipe having within it a ⅞ to 1⅛-in. orifice with straightening vanes ahead of it.

The calibration curve for the metering tube is furnished by the orifice manufacturer. The cure has values of orifice differential pressures plotted along its abscissa and corresponding cfm values plotted along its ordinate. A balancing valve in the line regulates the flow of supply air. A differential pressure gauge measures the drop across the orifice.

After the system has been sealed, the tester is connected to the test duct with a flexible hose. The duct under test has a short inlet section of pipe with a static pressure gauge mounted on it. With the balancing valve wide open, the blower is started and the system pressurized until the system static pressure

NEWS LIBRARY OF PROFITS

Advances In Cryogenic Engineering. Vols. 1 ☐, 2 ☐, 3 ☐, 4 ☐, 5 ☐. $13.50 ea. Vol. 6 ☐, $15

☐ A.G.A. Gas Heating Controls Service Manual—$9

☐ **Air Conditioning the Home—$3**

☐ **Boilers: Types, Characteristics, and Functions—$15**

Commercial Refrigeration—$1.50 each. ☐ **C-1** ☐ **C-2** ☐ **C-3**

☐ **Design of Air Conditioning Systems $8**

☐ **Design of Heating & Ventilating Systems $8 (Combination price of above two—$14)**

☐ **Design of Industrial Exhaust Systems—$6**

☐ **Handbook of Air Conditioning, Heating & Ventilating—$15**

☐ **Machinery's Handbook—$13**

☐ **Handbook of Instrumentation and Controls—$15**

Key to Air Conditioning—$2 each. ☐ **K-1** ☐ **K-2** ☐ **K-3**

☐ Ideas, Inventions, and Patents—How to Develop and Protect Them—$5.95

☐ Legal Problems In Engineering—$7.50

☐ **Management Guide for Dealer-Contractors—$18**

☐ **National Warm Air Heating & Air Conditioning Library (complete)—$20**

☐ **New Master Service Manual—$1.50**

☐ 1961 ASHRAE Guide and Data Book—$12.50

☐ **Plant & Process Ventilation—$9**

☐ Principles of Refrigeration—$12

☐ **Refrigeration and Air Conditioning—$8.50**

☐ **Refrigeration Engineer's Manual—$3**

Refrigeration Problems and Their Solution—$1.50 each

☐ **J-1** ☐ **J-2** ☐ **J-3** ☐ **J-4** ☐ **J-5**

☐ Residential and Commercial Air Conditioning—$9

☐ Standard Refn. and Air Cond. Questions and Answers—$6.95

Servicing Automobile Air Conditioners. ☐ **Vol. 3 $1** Vols. 1 ☐, 2 ☐, 4 ☐, **$2 ea.**

☐ **Parts and Labor Rates for Auto Air Conditioning—$30**

☐ **Summer Air Conditioning—$8**

☐ **Winter Air Conditioning—$8 (Combination price of above two—$15)**

Temperature Measurement In Engineering. ☐ Vol. 1, $4.95. ☐ 2, $13

☐ One Foot In the Door (the specialty salesman)—$3

☐ Both Feet on the Ground (the specialty dealer)—$5.95 (Combination price of above two—$7.50)

10-2-61

Business News Publishing Co.
450 W. Fort St., Detroit 26, Mich.

Please rush me books checked above.

Name .....

Company .....

Street .....

City..... Zone... State.....

☐ **Send COD** ☐ **Payment enclosed**

PRODUCT COORDINATOR INDUCTOR UNITS

Multi-plant division of major corporation engaged in the engineering, manufacture, and sale of commercial and industrial air conditioning equipment has a "ground floor" position available for an engineer experienced in the application and marketing of induction units as applied to central air conditioning systems. Candidates should be graduate engineers with air conditioning experience including design, application, and sale of inductor units.

Interested candidates should forward complete resume, including salary requirements, in complete confidence to: BOX A6878, Air Conditioning, Heating & Refrigeration News.

CLASSIFIED ADVERTISING

RATES for "Positions Wanted" $7.50 per insertion. Limit 50 words. 15¢ per word over 50.

RATES for all other classifications $10.00 per insertion. Limit 50 words. 20¢ per word over 50.

ADVERTISEMENTS set in usual classified style. Box addresses count as five words, other address by actual word count. Please send payment with order.

POSITIONS WANTED

25 YEARS' experience in the field and management of 60 man field operation. Entered the industry after graduation from Chicago Technical College, as shop mechanic, then to service engineer, supervisor, service manager, and general manager. 22 years with same firm. At present am operating own contracting firm on a profitable basis. Desire the opportunity to apply my knowledge to larger operation. C. S. (Charlie) MAYNARD, 1920 W. Fargo St., Chicago, Illinois.

SALES MANAGER ready for new connection in national or regional post. Heavy and successful experience in marketing packaged equipment, including heat pumps and window units. Interested in medium-sized or small manufacturer in need of new merchandising effort. BOX A6874, Air Conditioning, Heating & Refrigeration News.

ARE YOU looking for, — a seasoned, mature and experienced sales manager, sales engineer or manager of distribution? Product manager? A man with an industry wide reputation for original equipment design, installation design and application, merchandising know-how among dealers, distributing wholesalers and wide contacts among consulting engineers? Experienced in merchandising dealer training programs, wholesale distribution development residential split systems, heat pumps, warm air heat and packaged as well as field assembled equipment through 150 tons reciprocating. If you are looking, will consider either direct factory connection or a solid distributor and mechanical engineering organization with nationally recognized lines, used to big ticket sales. Excellent references available. Location immaterial. Available at once. Reply immediately to BOX A6875, Air Conditioning, Heating & Refrigeration News.

REFRIGERATION AND air conditioning service engineer. 34 years old with 12 years' experience. Also had 2 years' technical school. Considered good in selling. Have top reference in both fields. Would like to relocate. Prefer the Southwest. BOX A6876, Air Conditioning, Heating & Refrigeration News.

SALES AND promotional man with 13 years' diversified experience desires position with reputable concern in heating, air conditioning and/or refrigeration field. Willing to relocate. Background includes service, sales, field sales and service training, application engineering and factory contact man. Now employed, but unable to use all capabilities in present position. BOX A6880, Air Conditioning, Heating & Refrigeration News.

POSITIONS AVAILABLE

TWO SALES engineers needed for rapidly expanding midwest market for Wether-Bee heat pumps. Sales and application engineering experience required. Send resume of performance to: HEAT PUMP SYSTEMS, INC., 232 So. River Street, Aurora, Illinois.

LEADING SMALL manufacturer of top quality window units and related specialties wants capable product sales manager experienced in selling "professional" air conditioning trade through established and new manufacturers' representatives. Salary and bonus. Contact: H. W. Field, REMINGTON AIR CONDITIONING, Auburn, New York.

NEED SALES engineer for Amarillo, Texas, office of Carrier distributor. Contact RUSSELL L. SIGLER, 3819 Avenue A, Lubbock, Texas.

ADDITIONAL SERVICEMEN needed, commercial air conditioning and refrigeration service and installations, experienced, sober. Good salary. Steady employment. Hospitalization benefits. Give references, present salary, and experience. Our firm in business over 30 years. AARON TORCH & SONS, INC., 452 First Street, Macon, Georgia, SHerwood 6-5666.

POSITIONS AVAILABLE for air conditioning and heating mechanics and sheetmetal mechanics. Apply in person. T. M. WILLIAMS CO., 979 Volusia Avenue, Daytona Beach, Florida.

WANTED — DYNAMIC salesmen who want to make a lot of money selling the most extraordinary, alluring, compelling line of air conditioners in America. Write: P.O. BOX 35546, Dallas 35, Texas.

SALES ENGINEER, technical graduate or equivalent with refrigeration and sales experience. Age 23 to 36. Interesting work calling on contractors, wholesalers and air conditioning and refrigeration manufacturers in established territories for a nationally known control manufacturer. Starting salary based on experience. Replies should contain complete resume of education and experience. All replies will be kept confidential. BOX A6829, Air Conditioning, Heating & Refrigeration News.

ESTABLISHED MANUFACTURER of heat transfer products wants representatives for line of air cooled condensers and related air conditioning equipment. Address replies to BOX A6866, Air Conditioning, Heating & Refrigeration News.

OUTSIDE SALESMEN, long established wholesale refrigeration and air conditioning equipment supplier. Knowledge of refrigeration and air conditioning applications and parts essential. Salary and employee benefits, location southern California. Write fully in confidence stating experience, and salary required. Enclose photo. BOX A6867, Air Conditioning, Heating & Refrigeration News.

REFRIGERATION ENGINEERS, JRS. Leading commercial refrigerator manufacturer located 30 miles south of Albany has outstanding opportunities for junior engineers experienced testing out, drawing conclusions and making recommendations. Some design and development background desired. Salary open, progressive management, excellent benefit program. Write fully and in confidence stating experience and salary required to: BOX A6877, Air Conditioning, Heating & Refrigeration News.

SALES ENGINEER to cover exclusive Philadelphia and southern New Jersey territory for long established firm handling top lines of ammonia and Freon refrigeration, air conditioning and ventilation equipment. Must have technical degree and related sales experience. Age under forty-five. High commission earnings against substantial base. BOX A6879, Air Conditioning, Heating & Refrigeration News.

EQUIPMENT FOR SALE

MAKE EXTRA Winter profits: Display and sell a top line of room air conditioner Winter covers. Indoor and outdoor types available for immediate delivery from stock. Send for free alphabetical directory and price sheet. The price is low—the markup high—act now. JIFFY COVERS CORP., 614 Third Avenue, New York 16, New York.

BRAND NEW icemaker pump motor and impeller repair kits for Scotsman Carrier $18.00 at Kesco wholesalers coast to coast. Bronze replacement icemaker pumps for York Carrier $29.95. Hose connection adaptors for York Carrier $1.00. Complete line condensate pumps from 10' to 50' head, 115-208-230 volts. Catalog. KESCO, Jamaica 13, N. Y.

ATTIC INSTALLATION kits for 2 and 3 ton air conditioning units consisting of aluminum fiberglass duct work, ceiling outlets and return air grilles. Special closeout prices. STANDARD AIR SERVICE CO., 1225 S. Wabash, Chicago, Illinois, HA 7-4567.

ATTENTION REFRIGERATION Servicemen. Send for catalog listing values in refrigeration and air conditioning parts, relays, capacitors, compressors. Savings up to 50%. WALTER W. STARR, 2833 Lincoln Ave., Chicago 13, Illinois.

BUSINESS OPPORTUNITIES

IF YOU are a distributor of a major line of food market refrigeration equipment—and want to step up your 1. Income, 2, Territory (protected), 3, Prestige, 4. Growth, write to the president, BOX A6865, using your business letterhead. Ours is a state-wide key-distributor arrangement, tailor-made for a hard-hitting organization. We are particularly interested at this time in the states of Tennessee and Kentucky. Other areas might be arranged if you can sell us on your abilities. BOX A6865, Air Conditioning, Heating & Refrigeration News.

FOR SALE: Old established commercial refrigeration service business. Large territory to service, above average line of clientele. No competition. Large shop 30' x 45' concrete block. Well stocked and equipped on 75' x 125' lot. New modern home on adjoining lot 75' x 125'. All in A-1 shape. Beautiful family operation. Very sound investment. All for $26,000. BOX A6871, Air Conditioning, Heating & Refrigeration News.

WANTED TO buy. Commercial refrigeration business—well established —minimum gross $50,000 per year. New York City area. Please write all particulars: amount of men employed, equipment, how much desired for business, etc. Write to BOX A6873, Air Conditioning, Heating & Refrigeration News.

FOR SALE: Air conditioning and heating business, national brand franchise. Well established in commercial and residential sales and service. Located in north central Texas, heart of nation's fastest growing section. Fully equipped shop; three trucks, sheet metal equipment, all necessary tools. Good lease, new building, located in choice section of city. BOX A6881, Air Conditioning, Heating & Refrigeration News.

PATENT PENDING on adapter for casement windows and others. Fits any size air conditioner, requires no installation, can be moved from room to room and is very economical. Patentee will discuss any reasonable offer. BOX A6882, Air Conditioning, Heating & Refrigeration News.

MISCELLANEOUS

"KEY TO Air Conditioning" by James J. LaSalvia unlocks the door to profits in commercial, institutional, and industrial air conditioning. Available in three volumes K-1, K-2, and K-3 at $2 each. See your wholesaler or order from BUSINESS NEWS PUBLISHING CO., Dept. B, 450 W. Fort, Detroit 26, Mich.

gauge reading is that specified. The balancing valve is adjusted until the reading on the system gauge is stabilized at specified pressure.

At this stage of the test, flow through the orifice represents the air quantity required to offset duct leakage. It represents air leakage at specified static pressure. Its value may be found by noting the differential-pressure-gauge reading and finding the corresponding value in cfm from the orifice calibration chart.

Duct-tightness efficiency may be computed from the equation

$$E = \frac{Q - q}{Q} \times 100$$

where **E** is the duct-tightness efficiency, **Q** is the cfm carried by the test duct under normal operating conditions and **q** is the cfm lost by the test duct through leakage.

Suppose, for example, specifications state:

". . . the high velocity ductwork shall be tested in sections as the work progresses by sealing off the section under test and placing the section under an air pressure of 8 in. of water. Air lost by leakage shall not exceed ½% of the total air quantity . . ."

Suppose the total air quantity carried by the duct under normal operating conditions is to be 2,500 cfm. From the specifications above, the permissible air loss is ½% of 2,500 or 12.5 cfm.

Let us assume that in our example the differential pressure across the orifice is found to be .20 in. of water. Suppose this differential corresponds to an air flow rate (= leakage) of 9.4 cfm on the calibration curve. This value is .38% of the total air quantity carried by the test duct and is well below the maximum allowable leakage.

To calculate duct-tightness efficiency:

$$E = \frac{Q - q}{Q} \times 100$$

$$= \frac{2{,}500 - 9.4}{2{,}500} \times 100$$

$$= 99.62\%$$

A self-contained instrument has been developed by Pacific Air Products Co. for the purpose of testing duct tightness as described. Known as the "Port-O-Lab," it has its own blower, three switched Magnehelic gauges (one for each of three pressure ranges) and a fourth Magnehelic gauge for measuring static pressures. In addition, it has two external switched connections for checking external static pressures, velocity pressures, air velocities, and drops across attenuator boxes, coils, filters, and other devices.

Summary of Methods

Our analysis of the three test methods discussed above for determining duct leakage may be summarized as follows:

First, the test by inspection and observation is qualitative only. Its value is limited to locating relatively large leaks. Second, the test by measurement of static pressure loss for a specified time interval is an application of the hydrostatic pressure test for liquid lines (which must be perfectly tight) to building air distribution systems.

Because air leakage cannot be directly determined by this method, it is almost always extremely conservative, often resulting in costly expenditures of time and labor to make ducts which already meet practical requirements for air-tightness even tighter.

Third, the duct-efficiency test, by evaluating air loss quantitatively, allows the design engineer to set a standard for the amount of leakage a system can afford and to insist in his specifications that this standard be met.

Ducts 99.5% air-tight are acceptable to most engineers.

Such a value for duct efficiency would allow a system handling 40,000 cfm, for example, a loss of 200 cfm in duct leakage at specified pressure.

To develop this example further:

If we assume an air velocity of 4,200 fpm and a duct volume of 5,000 cu ft, this would represent a 42-in. diameter duct system, 520 ft long, which is really big. If the system were sealed and tested by the static-pressure-loss method, allowing a 3-in. drop in five minutes from a specified 8-in. initial static pressure, it would lose 37 cu ft of standard air over the five-minute test period.

The leakage would amount to an average value of 7.4 cfm, or .019% of the air quantity handled. On the other hand, if this same sealed system lost an allowable ½% in leakage, the static pressure would drop from 8 in. to 5 in. in less than 15 seconds.

The current trend in architectural design of multi-story buildings is to allot less and less duct and equipment space for air conditioning installations.

In all probability, equipment will become more compact — even if the design of such equipment requires the application of ideas and principles new to the field. Air velocities and pressures will be higher and ducts smaller. It is to be expected, then, that problems of duct leakage will increase in importance.

Questions and Answers About High Velocity Duct Systems

In the session on high velocity ducting held at the Western Conference on Air Conditioning, questions from the floor were answered by Louis R. Hess, F. B. Gardner Co., Inc., who chairmanned the session, and by Sheff. Following are some of the more pertinent questions, with the answers:

Question: How do you take care of expansion in long runs?

Answer (by Hess): There are usually elbows in long duct runs. Also, the temperatures at which double-duct systems operate remain relatively constant. For the sheet-metal-duct coefficient of expansion, we have never found this to be a problem.

Question: What do you consider as "high velocity?"

Answer (by Hess): We consider a duct velocity as being high when it exceeds 4,000 fpm, but is below 12,000 fpm. Air velocities greater than 12,000 fpm I would classify as ultra-high velocities. Today there are few systems where velocities exceed 12,000. In present-day systems, velocities range between 5,000 and 7,000 fpm, but there is no reason why they cannot be increased.

Question: While testing, how do you locate a leak physically? Do you use a soap solution?

Answer (by Hess): We have found a soap solution the most effective way of locating an air leak. If an installed system cannot meet the air-tightness specification, we have found the best way of locating leaks is to apply a solution of Lux detergent with a paint brush. We have generally found that if a duct system cannot hold air pressure, there are usually a whole series of leaks. And they are not easy to find. If a ½% leakage occurred at the end of the duct run, it might be difficult getting an attenuator box to function.

Question: With a 6-to-1 aspect ratio rectangular duct, are there any particular problems at velocities of, say, 1,200 to 1,500 fpm?

Answer (by Sheff): I would say no. Generally such an aspect ratio is not recommended because of the high friction loss inherent in a duct of these proportions. However, at these relatively low velocities, probably the only disadvantage of this relatively flat duct is the penalty to be paid in relatively high friction loss.

Question: How many men should make up an installation crew for high-velocity ductwork?

Answer (by Hess): Three. We have found that a fairly efficient small installation crew or team consists of one man assembling duct on the floor and two men standing on a scaffold hanging the duct.

Question: How large or small a section of duct should be tested at one time?

Answer (by Hess): Size of the unit tested doesn't matter too much. It depends on the test method used. In a small section of duct, pressure will fall rapidly if there is a very small opening somewhere in the duct section.

In a large duct section, the pressure will fall more slowly. If the allowable leakage is ½%, it doesn't matter how large or small a section is tested. It is the over-all loss relative to the air quantity handled that is important.

Question: Is it advisable to test the complete system from the air handling unit, or should the ductwork be tested in sections?

Answer (by Hess): We have found it impracticable to test the entire system at one time. It is much easier to test a section, a zone, or part of the floor's ductwork at any one time. And it is easier to locate any air leaks when tests are conducted in this manner.

Question: What type of material do you recommend for flexible connections? Canvas? I assume that there are flexible connections somewhere in a high velocity system.

Answer (by Hess): There almost has to be. Such connections are commonly referred to as canvas connections. They may be canvas, or glass cloth impregnated with neoprene, or asbestos fabric. We most often use glass cloth impregnated with neoprene. The connection has to withstand system pressure which is, give or take, 8 in. on most systems. It should be fairly tight.

Question: In checking pressure loss or leakage, is the test carried back through the blower housing also?

Answer (by Hess): No. The system on the discharge side of the fan is the section we are most interested in. I see no particular reason for testing the blower housing.

PATENTS, which have been omitted from this issue to make room for more information on air handling, will be resumed in the Oct. 9 issue.

Worthington Names Patrick McManus

HARRISON, N. J.—Patrick L. McManus has been appointed general manager of Worthington Corp.'s Standard Pump Div. at East Orange, N. J.

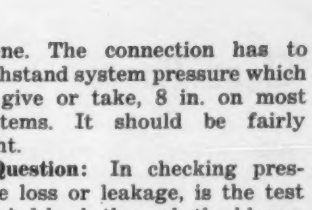
He was formerly director of marketing services at the company's world-wide headquarters in Harrison.. The Standard Pump Div. manufactures centrifugal pumps for all industrial and marine uses and rotary pumps for hydraulic systems and viscous fluids.

Advertisers In This Issue

The following list of advertisers in this issue is published solely as a convenience. While every effort is made to maintain accuracy and completeness, last minute changes may occasionally result in unavoidable omissions or errors.

Acme Industries, Inc. 25
Addison Products Co. 4
Air Conditioning, Heating & Refrigeration Industry Exposition 24
Air Control Products, Inc. 2
Airserco Mfg. Co. 25
Alco Valve Co. 5
Allin Mfg. Co. 33
Harry Alter Co., Inc. 28
Barnebey-Cheney Co. 22
Chevrolet Division of General Motors 20-21
Dunham-Bush, Inc. 34
Figueroa Hotel 31
Furnas Electric Co. 29
The Garman Co. 22
General Electric 3
Gould-National Batteries, Inc. Engine Parts Div. 12-13
Gustin-Bacon Mfg. Co. 6-7
Halstead & Mitchell Co. 23
Hermetics, Inc. 22
Holsclaw Bros., Inc. 30
Janitrol Heating & Air Conditioning A Div. of Midland-Ross 9-10
Lehigh Mfg. Co. 26
Lennox Industries, Inc. 16-17
McQuay, Inc. 15
Mechanical Industries Prod. Co. 26
Penn Controls, Inc. 11
Ranco, Inc. 8
Refrigeration Appliances, Inc. 30
Phil Rich Fan Mfg. Co., Inc. 8
St. Clair Rubber Co. 31
Tuttle & Bailey, Div. of Allied Thermal Corp. 18-19
United States Air Conditioning Corp. 28
Wagner Electric Corp. 24
Walton Laboratories, Inc. 29
A. H. Witt Co., Inc. 33

WITT LOW TEMP.
Defrostair COIL WITH EXCLUSIVE PATENTED
Automatic Electric Defrost System

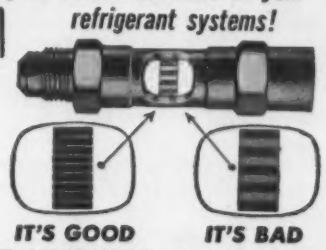


PAT. NO. 2539818 -3492970

DEFROSTS AUTOMATICALLY
FOR LOW TEMPERATURE ROOMS, FOOD STORAGE, FOOD FREEZING, ICE CREAM STORAGE, INDUSTRIAL LOW TEMP. APPLICATIONS.
Witt exclusive Defrostair patented Heat Trap coil requires only a low cost single pole, double throw time clock for complete automatic defrosting. Easy low cost installation. Requires no re-evaporation or special plumbing. Completely automatic. Available in 21 models ranging in BTU capacities from 1400 to 44,100 at 10°T.D. Write today for complete Witt Catalog.

Defrostair FOR BELOW FREEZING
A. H. WITT COMPANY, INC.
940 N. Sycamore Ave., Los Angeles 38, Calif.

Simplest, most economical way to detect moisture in your refrigerant systems!
Positive Sealing LIQUID EYE® INDICATOR featuring the built-in MOISTURE-REACTOR



No more guesswork about the condition of your F-12 and F-22 refrigerant systems. No installation problems either.
Now you can get both in the same unit ...LOWEST COST MOISTURE REACTOR PROTECTION PLUS ALL THE PROVED LIQUID EYE FEATURES!
CONTACT YOUR WHOLESALER TODAY

IT'S GOOD
The MOISTURE-REACTOR is composed of alternate, permanent and changing (Reactor) color bars. When all the bars appear the same color (green)—it's good—there's no moisture in system.

IT'S BAD
If moisture enters the system, every other color bar changes from green to yellow—then it's bad—the dehydrator should be replaced. When the system is moisture-free again, the Reactor color bars will change back to their original solid green color.

Allin ALLIN MANUFACTURING CO.
410 NORTH HERMITAGE AVE. • CHICAGO 22, ILLINOIS
OVER 1,000,000 LIQUID EYES SOLD TO DATE!

Clean Rooms--

(Continued from Page 1, Col. 2)

being asked to meet.

Bodem promised to serve as mediator between industry and governmental contractual enforcement agencies in interpreting the technical order for specific contamination control applications.

They agreed that contamination control design criteria had to consider the needs of the product involved, and that it is difficult to set standards that will apply to all products indiscriminately.

As one instance, they questioned the propriety of specifying 40% r.h. ±5% in the more critical Class III or Class IV clean rooms as appears in the Technical Order. They pointed out that higher humidities are needed in some cases to control static electricity and lower humidity is essential in other cases to prevent rust on highly machined surfaces.

Citing confusion among manufacturers on basic criteria, Bodem called for standardization of all phases of contamination control nomenclature and methods.

Other subjects discussed at the meeting included personnel training and clothing, air filtration, particle counting and monitoring, particle count tolerance, vacuum cleaning, ultrasonic parts cleaning, personnel cleaning, utilities, and fixtures.

Iron Fireman--

(Continued from Page 1, Col. 5)

price, the proposed transaction would involve $858,000 in stock.)

The letter said the exchange would take place "when a registration statement for such additional shares becomes effective."

In addition, the letter stated, "to simplify its stock structure we intend to lend our proposed new subsidiary approximately $420,000 with which it would retire its 5½% cumulative preferred stock."

Although Warren Webster would be operated as a subsidiary, the letter said, "we will take immediate steps to integrate certain areas of its operations with those of Iron Fireman to the benefit of both companies."

With a plant in Cleveland and in Toronto, Ont., Can., Iron Fireman produces gas and oil-fired heating and air conditioning equipment. In addition, two facilities in Portland, Ore. manufacture aircraft parts and assemblies and electrical components for aircraft and space vehicles. Net sales in 1960 were $28,057,480.

Warren Webster, a long-established and closely held company, makes heating, ventilating, and air conditioning equipment. According to one report, it has annual sales of about $7 million. Another report said that in the industry, the company's sales are estimated to fall in the $9-$10 million per year range.

NEWS readers are invited to write to the editor giving their opinions on any subject of interest to the industry.

Room Unit Seal

NEMA Certification Seal, attesting to accuracy of the cooling capacity rating of room air conditioners will be affixed to each unit under a program sponsored by the National Electrical Manufacturers Assn. Actual size of the seal is 1¼ in. sq. Full details of the program were published on page one of the Sept. 25 issue of the NEWS.

Swearingen--

(Continued from Page 1, Col. 3)

operating cost saving over conventional units," according to the company.

"The efficiency of the new Statham-Swearingen air conditioning unit is the result of more than five years of scientific research in developing the principle of producing cold from a gas flame by a new lithium bromide-water absorption cycle based on the two-effect generator principle," the company stated. "This development is considered a major scientific breakthrough in commercial air conditioning and industrial chilling.

"Friday's demonstration showed the high efficiency of applying the two-effect principle to commercial size air conditioning applications."

Last December, Statham-Swearingen "demonstrated the feasibility of adapting its two-effect principle to industrial cooling applications," the announcement noted. "At that time a 150-ton chiller was demonstrated to gas companies, air conditioning contractors, and representatives of the press.

SWEARINGEN Model GA-15 air conditioner.

"This chiller, which was sold to a customer in Texas, has been performing in accordance with efficiency expectations, cooling 40 million cu ft per day of sour well-head natural gas from 90°F. to 60°."

The present design of the Statham-Swearingen two-effect absorption device now can be applied efficiently to loads of from 1 to 1,000 tons, the company said.

Dr. Judson S. Swearingen, president of Statham-Swearingen, revealed that initial orders have been received for the company's new 50-ton direct gas fired air conditioning units, "which offer the same outstanding efficiency as the company's 15-ton units now beginning production."

Dr. Swearingen said that in the two-effect absorption cycle there is one Btu removed from the Statham-Swearingen unit for each Btu of heat supplied, and "this now makes cooling as inexpensive as heating."

There's something NEW in AIR HANDLING UNITS . . .

DUNHAM-BUSH "COMPACTS"
for COOLING • HEATING • HUMIDITY CONTROL

Compact modern design means lower shipping costs, lower installation costs, less required equipment area, more rigid assembly. 26 models are available, vertical or horizontal . . . with an overlapping range of air deliveries from 1000 CFM to 38,400 CFM.

Dunham-Bush Air Handling Units the "compact line" of the industry offers the architect, engineer, and contractor a diversified selection of floor or ceiling mounted central station units. These units are available with direct expansion, water or steam coils . . . or in combinations of these coils.

The Dunham-Bush-engineered flexibility of the component parts assures delivery of air, conditioned to fulfill any seasonal or product demand. Air can be cooled, dehumidified, filtered, heated and dehumidified . . . depending on the requirement.

Accessory equipment available includes mixing boxes, filter sections, face and by-pass dampers for close humidity control, and both water and steam spray humidifiers.

A wide range of air outlet locations and motor arrangements makes Dunham-Bush Air Handling Units easy to specify—easier to install.

For complete information request catalog 6011C

DUNHAM-BUSH DUNHAM-BUSH, INC.
WEST HARTFORD 10, CONNECTICUT, U. S. A.
SALES OFFICES LOCATED IN PRINCIPAL CITIES